Household Debt in New Zealand

Katherine Henderson and
Grant M. Scobie

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AUTHORS

Katherine Henderson

New Zealand Treasury
PO Box 3724
Wellington 6008
NEW ZEALAND

Email katy.henderson@treasury.govt.nz

Telephone +64 4 917-6028

Fax +64 4 473-1151

Grant M. Scobie
New Zealand Treasury
PO Box 3724
Wellington 6008
NEW ZEALAND

Email grant.scobie@treasury.govt.nz

Telephone +64 4 471-5005

Fax +64 4 473-1151

NZ TREASURY

New Zealand Treasury
PO Box 3724
Wellington 6008
NEW ZEALAND

Email information@treasury.govt.nz

Telephone 64-4-472 2733

Website www.treasury.govt.nz

Access to the data used in this study was provided by Statistics New Zealand in a secure environment designed to give effect to the confidentiality provisions of the Statistics Act 1975. A large portion of the analysis in this paper is based on data from the Survey of Family Income and Employment (SoFIE). Statistics New Zealand has initiated a systems review for SoFIE. Therefore data contained in this paper could be subject to change. However, any errors in the analysis are those of the authors, not Statistics New Zealand.

Abstract

In recent years, the total debt of the household sector has risen appreciably. This has led to concerns about "excessive" borrowing, and to the possibility that some households may have become unduly vulnerable in the event of unexpected shocks. This paper draws on both aggregate and household level data to assess the extent and composition of household debt; to analyse the distribution of debt in relation to income; to examine the factors associated with high ratios of debt servicing relative to income and consider the extent to which individuals and households are vulnerable to unexpected shocks.

Between 1982 and 2007, household debt grew from 33% to 149% of household disposable incomes. However due to the faster growth of assets, net wealth grew from 319% of disposable income in 1982 to 430% by 2002 and 604% by 2007; ie, even before the sharp rise in house prices, the overall balance sheet of households was stronger in 2002 than any time in the previous two decades, despite the increase in debt levels.

Mortgages represented about 85% of total liabilities, the balance made up of credit card debt and student loans. Higher absolute debt levels amongst couples were associated with home ownership and higher levels of assets and income. Maori and Pacific Island couples recorded liabilities some $6,500 greater than European couples.

The paper defines those as vulnerable as having debt servicing obligations exceeding 30 percent of their gross income. It is estimated that in 6.2% of non-partnered individuals and 8.1% of couples fell into this category in 2004. When the underlying levels of income, asset values and mortgage interest rates were adjusted to correspond to values in 2008, it is estimated that these proportions doubled.

Those at risk were defined as having debt servicing obligations exceeding 30 percent of their gross income and, at the same time, recording negative net wealth. In part, negative net wealth arises because of lack of any assets that match the liability of student loans. Some 1.9% of individuals were deemed at risk, falling to 1.5% when student loans were excluded.

Student loans distort the net wealth estimates of those holding them as only the liability with no corresponding asset is recorded. When this is allowed for, the share of non-partnered individuals at risk drops further.

The unit record data ended in 2004. However the paper makes projections to 2008. For non-partnered individuals; there was little or no change in our estimate of the proportion with negative net wealth who also had debt servicing costs exceeding 30% of their income (ie, at risk). However for couples our estimate of the proportion at risk rose from 0.8% to 1.1%, corresponding to an increase from about 6,000 to 8,000 families.

JEL CLASSIFICATION D31 Personal Income and Wealth Distribution

KEYWORDS Household debt; New Zealand; vulnerability

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Household Debt in New Zealand

1 Introduction

In recent years, the total debt of the household sector has risen appreciably. This has led to concerns about "excessive" borrowing, and to the possibility that some households may have become unduly vulnerable in the event of unexpected shocks. Falling house prices and the prospects of rising unemployment add to the concerns. Furthermore, these concerns have been reinforced by a declining and negative rate of aggregate household saving, as recorded by some measures[1].

Household debt when used appropriately is an important mechanism to allow households to smooth their consumption over the life cycle. In the early decades of a typical life cycle, borrowing for investment in education and skills, housing or major consumer durables allows consumption spending to be higher than it would otherwise have been. In later years when incomes are typically higher, the borrowing is repaid, reducing consumption below the level that would have prevailed. In addition, it is not uncommon for small businesses to be financed by loans secured against property. As a result, what is recorded as household debt contains a portion of the capital used by unincorporated enterprises.

Clearly, the fact that households have accumulated debt is not itself either remarkable or a cause for concern. Neither is the increase in household debt in New Zealand necessarily alarming. Higher incomes, low unemployment rates, the expectation of lower rates of personal income tax, rising asset prices and greater access to credit following deregulation of the financial markets all would have been logically expected to result in higher debt to income ratios across the household sector.

However, while the overall picture may not indicate any serious imbalances, aggregate household data may obscure the fact that some individuals and households may have built up levels of debt to the point that the servicing costs exceed their available income. Furthermore, there may be other households on the borderline that can currently service high levels of debt, but who remain highly vulnerable to any unexpected shocks. An illness, loss of a job or a rise in interest rates may tip them over into the "problem debt" category.

[1] The Household Income and Outlay Account of the System of National Accounts estimates a household saving rate for 2007 of -7% of nominal GDP, although caveats apply as the HIOA is "experimental".

The aim of this paper is to draw on both aggregate and unit record data to assess the extent and composition of household debt; to analyse the distribution of debt; to examine the factors associated with high debt servicing to income ratios, and to consider the extent to which families are vulnerable to unexpected shocks. We have classified households whose debt servicing costs exceed 30% (or in some cases 40%) of their gross income as falling into the category of "vulnerable". However, having a level of debt servicing that exceeds these limits is not in itself sufficient to classify the family as "at risk". We consider that the families most "at risk" or are those that are estimated to have high debt servicing costs in relation to their income and at the same time report having negative net wealth.[2]

The paper is structured as follows. The next section reviews highlights of some selected existing studies. Section 3 presents a synoptic view of household liabilities, based on data from the Reserve Bank of New Zealand (RBNZ) which extends to the end of 2007. Section 4 introduces the Survey of Family Income and Employment (SoFIE) and summarises the data from wave 2, which covers the year ending September 2004. Based on the SoFIE data, Section 5 analyses the extent of "problem debt" and vulnerability. Conclusions follow in Section 6.

It is acknowledged that the level and distribution of household assets and liabilities could have changed since 2003-04. The extent to which debt is a problem may well have increased as a consequence. For this reason, in Section 5 we make some limited projections to 2008.

[2] Since this report was completed the Families Commission in conjunction with the Retirement Commission have released two reports on debt. (See, Families Commission 2009 , Legge and Heynes 2008.).

2 Existing studies

The following is a brief summary of findings from a small number of studies that have analysed the extent of household indebtedness. Most of them relate to other countries but a small number of New Zealand studies were found. A variety of measures of indebtedness have been used and applied at either the aggregate or household level.

Kelly, Cassells *et al* (2004) use the HILDA Household Survey for Australia to analyse household debt in 2002. Total household liabilities as a share of disposable income was 130%, which was almost exactly the same as in New Zealand in 2002. In that year, Australia's total household debt was 60% of GDP while in New Zealand it was 67%. By 2005, total household debt in New Zealand in relation to GDP was slightly above the average for the OECD of 80%, but very comparable to that of Australia and the USA. However, in 2005, mortgage debt as a share of total liabilities in New Zealand was the highest in the OECD.[3]

Household leverage, defined as the ratio of liabilities to net wealth, is a further indicator of the potential vulnerability of the household sector to changes in asset prices. Yet, for this indicator, New Zealand was amongst the lowest in the OECD in 2005.

Increased borrowing in New Zealand has been associated with higher levels of interest payments for debt servicing. In the decade up until 2000, interest costs in relation to disposable incomes in New Zealand were largely in line with comparator countries. However by 2005 the ratio had risen sharply and was nearly double the average for the Euro area. By contrast, the median level of debt in relation to per capita income was amongst the lowest in a group of 10 major OECD countries for those in the lower half of the income distribution. In other words, those with relatively low incomes in New Zealand had much lower levels of debt in relation to income than in other OECD countries.

Overall, the evidence from comparisons with other countries is mixed. By some measures, New Zealand households are amongst the most indebted. On other measures New Zealand ranks amongst those with low levels of debt. In any event, debt levels per se do not necessarily translate into a share of households for whom debt is a problem. There are only a few indirect measures, such as difficulty paying bills, bankruptcy rates or mortgage defaults, that allow cross country comparisons.

La Cava and Simon (2003) report findings for Australia that indicated that up to 22% of Australian households were cash constrained in 2001. This includes all households answering yes to any one of a series of seven questions designed to capture the financial fragility of households. However such measures do not necessarily distinguish between over-indebtedness and problems associated with such factors as low incomes, erratic employment, or long term welfare dependency. While undoubtedly being cash constrained will be at least partially correlated with debt problems, one cannot assume that all those reporting cash constraints are necessarily overly indebted. The authors further report that most of the rise in household debt was attributable to households who were not cash constrained. In other words, increased aggregate debt does not necessarily mean an increase in the number of overly indebted households or even an increase in vulnerability.

[3] Findings reported here from the OECD are drawn from Girouard, Kennedy *et al* (2006).

There is very little evidence of the extent to which debt is a problem for New Zealand households. Valins (2004) examined evidence from the Household Savings Survey (2001), the Living Standards Survey (2000) and the Federation of Family Budgeting Services (2002-03) in an attempt to estimate the share of households who might be over-indebted in the sense that they were struggling to meet payments on monies owed. In 2000, some 17% of the population felt that they would not be able to obtain $1,500 in an emergency, suggesting that these people might be over-indebted, in the sense that existing debt levels would preclude further borrowing. He concluded that "a tentative working assumption is that up to 15% of New Zealand households may be over-indebted". However, he noted that only a third of these (about 5% of the population) are likely to have longer term problems, possibly requiring external intervention.

Redhead and Rose (1999) reported that over two thirds of those filing for bankruptcy in New Zealand in 1999 were beneficiaries, and nearly half were aged between 25 and 34.

May, Tudela *et al* (2004) reported similar findings for the UK. Much of the household debt was owed by homeowners with mortgages who appeared to have little problem in debt servicing. Debt problems were concentrated among renters. In part, this could be a reflection of the life cycle pattern of debt and asset holdings. Renters were typically younger with lower incomes and higher levels of unsecured debt.

Two salient points emerge from this brief synopsis of existing studies. In the first place, there is a wide range of measures that purport to capture the extent of household indebtedness. For this reason, this paper uses a number of indicators. Second, while aggregate data for the household sector can provide an overview of broad trends, detailed household level measures are needed if we are to better understand the factors which underlie households' decisions to acquire debt, and the extent of vulnerability. In this paper we draw on both aggregate data and the results of a major national survey covering the assets and liabilities of households. The former source provides an overview of the growth of household debt and relates it to assets and net wealth. The latter is used to explore the factors associated with high levels of debt and to estimate the share of those with debt who are "at risk".

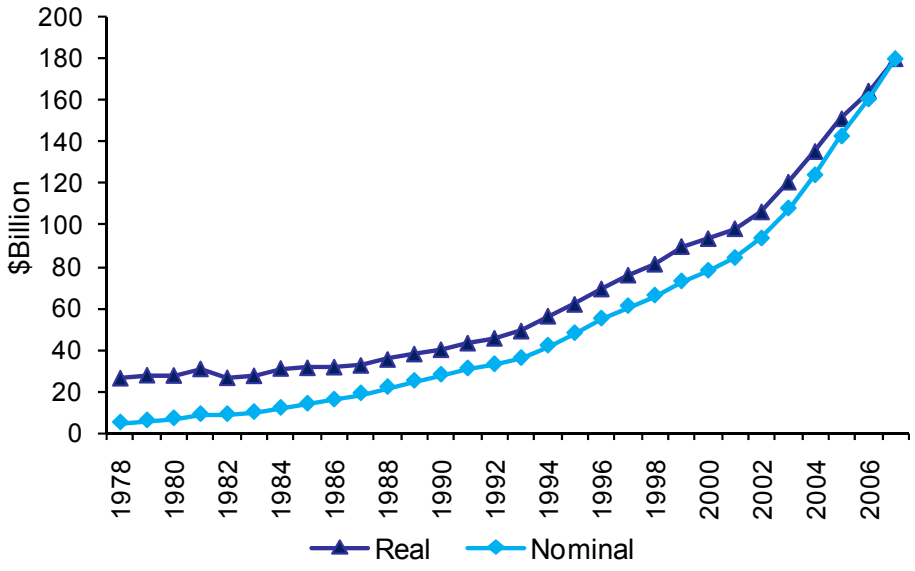
3 Debt in the Aggregate Balance Sheet of Households

This section examines the aggregate balance sheet of households in New Zealand. Using the long-run annual series of the financial assets and liabilities of households compiled by the RBNZ, we present changes and trends in the level and composition of household debt.[4]

3.1 Trends in household liabilities

Total household liabilities have increased in both real and nominal terms. However, until 1990 the growth was moderate (Figure 1). Following the deregulation of financial markets, the growth of liabilities accelerated, and in the last 5 years has been driven by lower real interest rates and rising house prices.

Figure 1 – Total household liabilities: 1978 - 2007



Source: RBNZ; Treasury; real data are in constant 2007 prices

3.2 Assets, liabilities and net wealth

While concern has been expressed at the rising level of household debt, this has to be placed in the context of the aggregate balance sheet of households. Table 1 provides several snapshots of the growth of assets, liabilities and net wealth from 1982 to 2007. Although total liabilities have grown at a faster rate than assets over the period, real net wealth per capita has still grown at an average annual rate of 3.6% over the period.

The period between 2002 and 2007 stands out as having strong growth in assets, liabilities and net wealth (see column 7 of Table 1 and Figure 2). This is largely due to unprecedented increases in both housing assets and liabilities. Housing assets grew at

[4] See Household Financial Assets and Liabilities: Annual Series 1978 to 2007, http://www.rbnz.govt.nz/statistics/az/2989639.html.

an annual average rate of 13.9% between 2002 and 2007 and mortgages grew by 12.0%. As a result, there was a fall in the ratio of liabilities to assets in housing and an increase in net equity in housing of nearly 15% per annum. Overall, the rapid growth in liabilities was outpaced by the growth in assets over this period, resulting in a substantial increase in net wealth of households. Notable, however, is that of the total increase in net wealth between 2002 and 2007, nearly 80% came from housing.

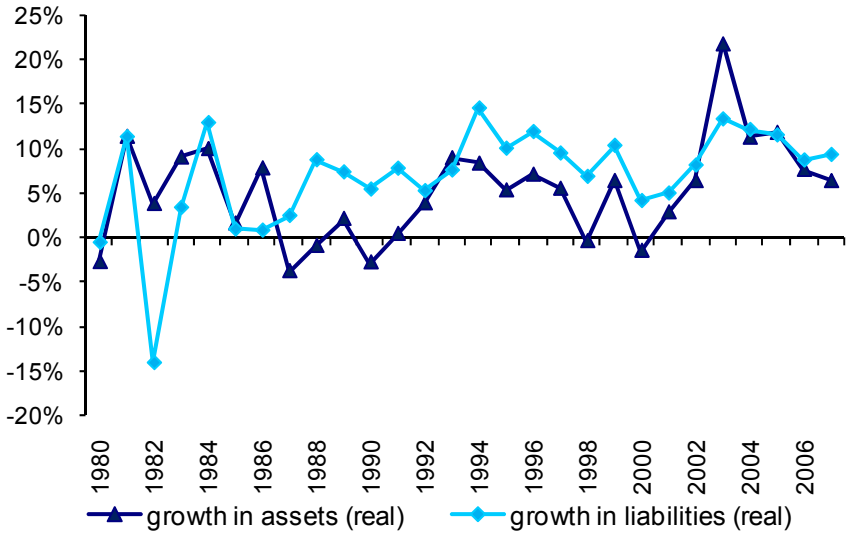
Table 1 – Assets and liabilities of households (2007 constant prices, $billions)

	1982	1992	2002	2007	1982-92	1992-02	2002-07	1982-07
Assets				Annual average growth rates[1]				
Housing	141	181	320	614	2.6%	5.8%	13.9%	6.1%
Non-housing	82	109	148	200	2.8%	3.1%	6.3%	3.6%
Total	223	290	468	814	2.7%	4.9%	11.7%	5.3%
Liabilities								
Housing	20	40	89	156	6.9%	8.3%	12.0%	8.5%
Non-housing	6	5	17	24	-0.6%	12.3%	6.1%	5.7%
Total	26	45	106	180	5.6%	8.9%	11.1%	8.0%
Net wealth								
Housing	120	141	231	458	1.7%	5.0%	14.6%	5.5%
Non-housing	76	103	130	176	3.1%	2.4%	6.3%	3.4%
Total	196	245	361	634	2.2%	4.0%	11.9%	4.8%
Liabilities to assets								
Housing	0.15	0.22	0.28	0.25	4.2%	2.4%	-1.7%	2.3%
Non-housing	0.07	0.05	0.12	0.12	-3.4%	8.9%	-0.1%	2.0%
Total	0.12	0.16	0.23	0.22	2.8%	3.8%	-0.6%	2.5%
Per capita Net wealth ($000)	61	69	91	150	1.2%	2.8%	10.4%	3.6%

[1] Growth rates are calculated as geometric averages for the specified periods.

Source: RBNZ; Treasury

Figure 2 – Annual average rates of growth in assets and liabilities: 1979-2007



Source: RBNZ; Treasury

It is likely that these data understate the true level of household net wealth. In the first place, the RBNZ series on which this analysis is based does not include all assets. Specifically, business assets owned by households are excluded along with some other categories. The RBNZ notes that the following are excluded:[5]

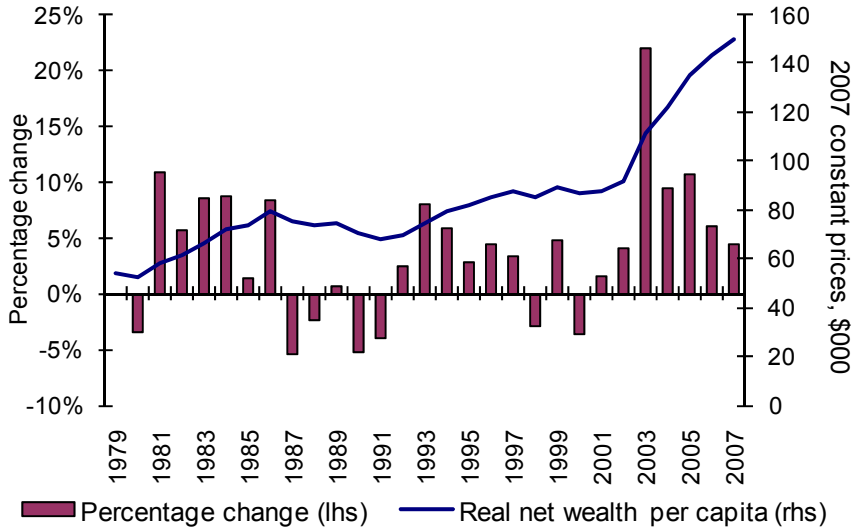
- Equity in farms
- Equity in unincorporated businesses
- Shares in unlisted incorporated businesses
- Capitalisation of the New Zealand Alternative Market (NZAX), the 'second board' of the New Zealand Stock Exchange
- Direct ownership of assets such as forests
- Consumer durables
- Overseas property owned by New Zealand residents
- Non-equity overseas financial assets
- Notes and coin held by households

At the same time, the data for mortgage liabilities is likely to overstate the level of housing liabilities. This arises as some types of mortgage accounts allow the holder to draw down funds for other purposes such as investments in unincorporated businesses owned by households. A more comprehensive view of the assets and liabilities of the household sector would likely result in higher estimates of net worth.

Figure 3 presents the level of net wealth per capita since 1979 (in constant 2007 dollars) along with its percentage change. In 21 out of 28 years, net wealth per capita has increased from its level in the previous year and has increased in each of the last seven years. So in the context of the growth in assets and net wealth, the observed increase in the level of household debt looks less alarming. However, it is again worth stressing that the recent gains are largely attributable to housing. A fall in house prices could be expected to remove at least some of these gains.

5 See http://www.rbnz.govt.nz/statistics/az/2989639.html.

Figure 3 – Net wealth per capita: 1979-2007 (in 2007 constant prices)



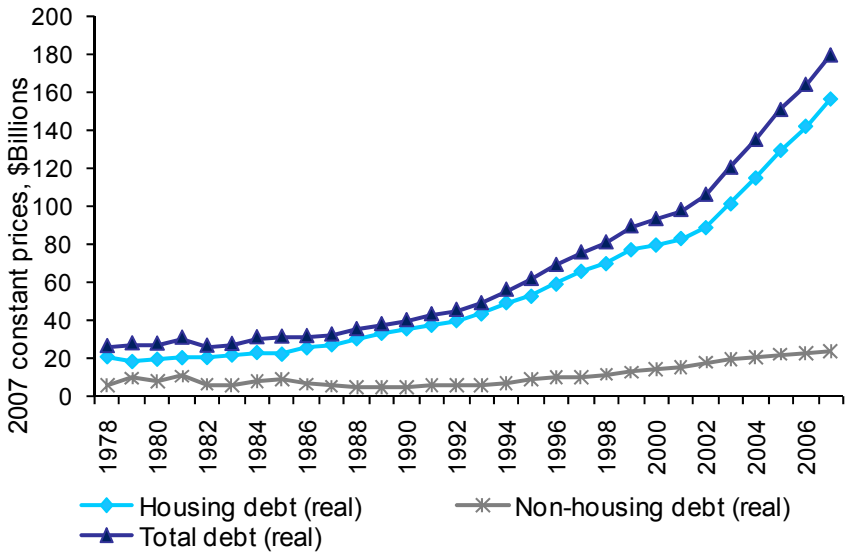
Source: RBNZ; Treasury

3.3 Composition of liabilities in the aggregate household balance sheet

Figure 4, Figure 5 and Table 2 show the breakdown of total liabilities in terms of levels and composition since 1978. Over the period 1978-1985, housing debt averaged 74% of total debt. However, relatively strong growth since then has resulted in an increase in its share of total liabilities, averaging 85% between 2002 and 2007. Before the deregulation of financial markets in the late 1980s, some borrowing for housing took place through such mechanisms as solicitors' trust funds. As a consequence, the data do not necessarily capture all housing loans, and both the level and proportion of debt due to housing may in fact be understated in the earlier period. In contrast, as noted above, the use of housing as collateral for loans to unincorporated small business enterprises owned by households may overstate the true level of housing liabilities in the later period. This would suggest that over the period 1982 to 2007, the annual average rate of growth in housing liabilities may well have been below the estimate of 8.5% shown in the last column of Table 1.

Nevertheless, housing debt remains a large component of household liabilities. Figure 5 underscores the volatility of the composition of liabilities over the late-1970s and 1980s. This period was characterised by substantial intervention in credit markets and a number of changes in the regulatory regimes and controls. Since financial deregulation in the late 1980s, the composition of liabilities in the aggregate household balance sheet has exhibited greater stability. The deregulation has lead to less reliance on credit cards and hire purchase, their share of total liabilities has fallen as other avenues of credit have become more freely available (Table 2).

Figure 4 – Housing and non-housing liabilities



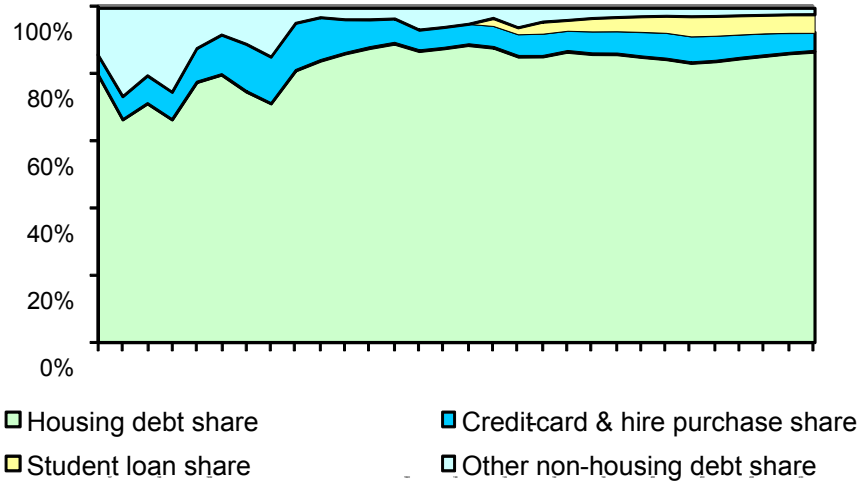
Source: RBNZ; Treasury

Table 2 – Composition of liabilities: 1978-2007

	1978-1985	1986-1993	1994-2001	2002-2007	1978-2007
Mortgages	74%	87%	86%	85%	83%
Credit card & Hire purchase	10%	9%	7%	7%	8%
Student loans	0%	0%	4%	6%	2%
Other	16%	4%	3%	2%	7%
Total	100%	100%	100%	100%	100%

Source: RBNZ

Figure 5 – Composition of liabilities



Source: RBNZ

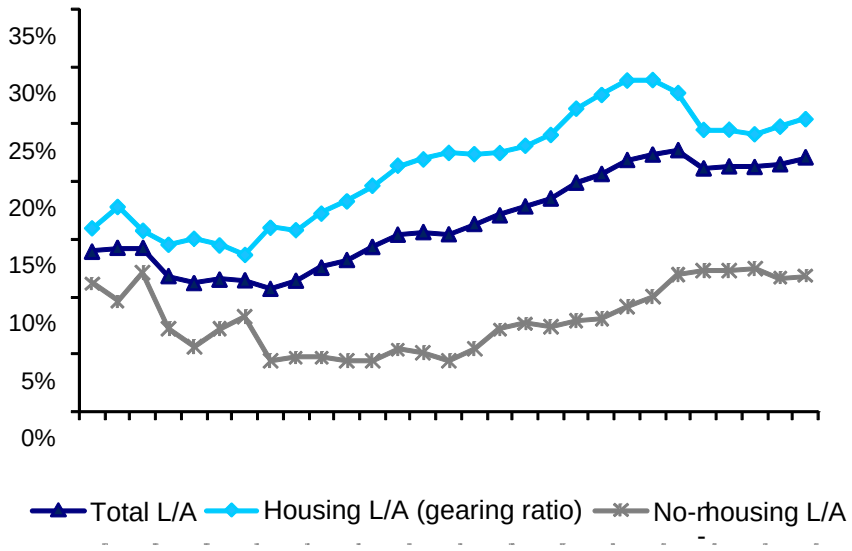
3.4 Liabilities relative to assets

Figure 6 displays trends in total liabilities as a percentage of assets and gives a housing and non-housing breakdown. The ratio of housing liabilities to housing assets is generally referred to as the gearing ratio and is sometimes used as an indicator of the indebtedness of households. The gearing ratio increased steadily from the mid 1980s, with mortgages as a share of housing value peaking at 29% in 2000. The recent boom in house prices was accompanied by a drop in the share, but it has remained steady at 25% since 2003. It should be noted that this measure of gearing includes all homeowners regardless of their debt level; the gearing ratio would be higher if it were possible to exclude the almost one half of all households with housing assets who are mortgage free.

Total liabilities grew by more than total assets over the period 1979 to 2007. As a percentage of total assets, total liabilities increased from 14% in 1979 to 22% in 2007. The trend tends to follow that of the housing gearing ratio due to the fact that housing is the largest component of both assets and liabilities[6], although the level is slightly lower due to the fact that non-housing liabilities are a smaller share of non-housing assets than is the case for housing.

Total household liabilities as a share of assets have increased substantially since the liberalisation of the financial markets. Arguably, a significant part of this rise has been a response by households to adjust their portfolios to their desired ratio of liabilities to assets. Credit and loans were not as readily available in the past; levels of household liabilities were probably constrained below that which households would have found optimal.

Figure 6 – Liabilities as a percentage of assets: housing, non-housing, total: 1978-2007



Source: RBNZ

[6] The average share of housing in assets and liabilities was 65% and 83% respectively over the period.

3.5 Assets and liabilities relative to household income

Nominal disposable income[7] increased at an annual average rate of 6.6% over the period 1982 to 2007. However, the annual average growth of nominal assets was nearly 10% and for nominal liabilities it was 12.7%. As a result, there has been substantial growth in both assets and liabilities as a percentage of household disposable income (Table 3 and Figure 7). Assets relative to disposable income increased from 362% in 1982 to 775% by 2007. Liabilities relative to disposable income increased from 43% to 171% over the same period.

Although non-housing assets and liabilities have risen, it is evident that the growth on both sides of the balance sheet has been largely driven by housing, most notably over the last 5 years where the ratio of housing assets to disposable income increased by 54%. This compares with a 66% increase in the ratio over the entire 20 year period prior to 2002. As much of the growth in net wealth relative to disposable income has been driven by housing, which is the largest component of both assets and liabilities, the household sector has become increasingly exposed to a house price shock.

Table 3 – Assets and liabilities as a percentage of household disposable income

		1982	1992	2002	2007
Assets	Housing	229%	269%	381%	585%
	Non-housing	133%	161%	176%	190%
	Total	362%	431%	557%	775%
Liabilities	Housing	33%	59%	106%	149%
	Non-housing	10%	8%	21%	22%
	Total	43%	67%	126%	171%
Net wealth	Housing	195%	210%	276%	436%
	Non-housing	124%	153%	155%	168%
	Total	319%	363%	430%	604%

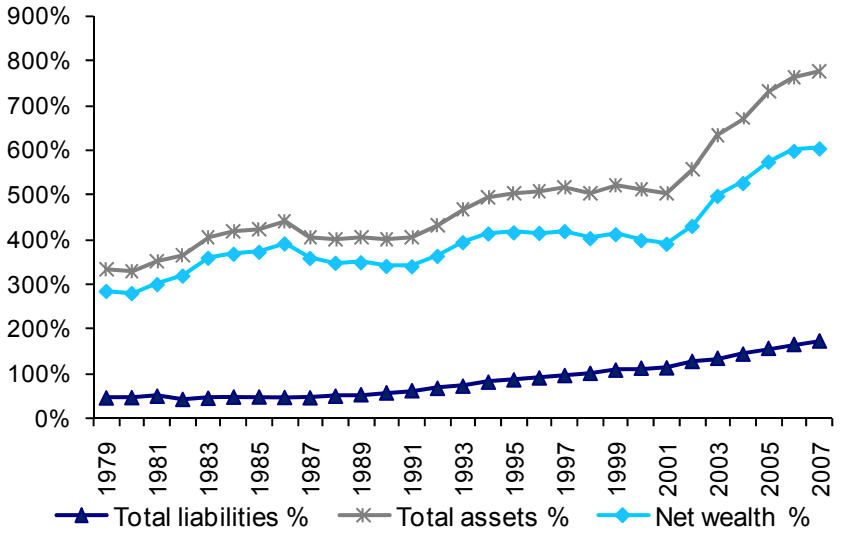
Source: RBNZ

It is evident from Figure 7 that the ratios of housing assets and net wealth to disposable income may be close to a peak in 2007. Additional housing data reveals that the value of the housing stock peaked in March 2008 and the June 2008 estimate was 3.5% below the December 2007 estimate.[8] Estimates for December 2008 indicate that the ratio of net wealth to disposable incomes had fallen from around 600% to 500% as a result of falls in housing values and financial asset prices.

[7] Disposable income is income available for consumption and saving ie, gross income less tax and including social welfare benefits. Imputed rent is also included. Note that the measure used in the Reserve Bank data includes consumption of fixed capital and household interest paid (ie, an estimate of debt servicing costs) which are both excluded from the System of National Account (SNA) measure.

[8] Source: http://www.rbnz.govt.nz/keygraphs/housingdata.xls.

Figure 7 – Assets and liabilities as a percentage of household disposable income



Source: RBNZ

4 Household debt from the Survey of Family, Income and Employment

The preceding section has provided an overview of the assets and liabilities of the household sector. However aggregate data can obscure a wide dispersion of individual circumstances. An exploration of the distribution of liabilities requires data measured at the unit record level. This section begins with an introduction to the Survey of Family, Income and Employment (SoFIE). Following from this, the SoFIE-based estimates of aggregate assets, liabilities and wealth are compared with the RBNZ aggregates that featured in the previous section. Basic descriptive statistics for the distribution of liabilities are then presented, followed by regression models that have been estimated to identify factors that are associated with debt levels.

4.1 Background to the Survey of Family, Income and Employment

SoFIE is a longitudinal survey where the original sample members are tracked and surveyed each year. The target population for SoFIE is the usually resident population of New Zealand living in private dwellings. The survey began in October 2002 with an original sample size of about 11,500 households, amounting to over 22,000 individuals 15 and over. Children younger than 15 who were living in households selected for the survey will also be tracked and will be surveyed from age 15. The survey will be run for a total of 8 years. The core survey collects information on family characteristics and labour market and income spells. An assets and liabilities module and a health module are included in alternate years. The analysis that follows is based on the first release of the second wave of SoFIE, which covers the year ending 30 September 2004, and contains the first assets and liabilities module. We have carried out our analysis at the economic family unit level. An economic family unit can be either a non-partnered individual or a couple, with or without dependent children.[9]

The advantage of unit record data over aggregate data is that it enables analysis of associations between variables at the unit level. In particular, we have been able to examine the levels and variability of debt, debt servicing and the proportion of families with "high" debt servicing costs across characteristics such as age and income. On the other hand, survey data can suffer from sampling errors and potential biases.

Sampling error can be quantified. Bias is more difficult to deal with and can arise for a number of reasons. The main factor is non-response bias that arises if those who don't respond have different characteristics from the respondents. The response rate for the first wave of SoFIE was 77% ie, 11,500 of the randomly chosen 15,000 households agreed to participate. Further, attrition bias may enter as people drop out of the survey in subsequent waves eg, 87% of those responding in wave 1 also responded in wave 2. Missing data within records is another type of non-response bias. To the extent that they can, Statistics NZ attempt to adjust for non-response bias by adjusting the weights so that the data match targets for selected demographic characteristics such as age and sex.

[9] The definition of a dependent child applied in SoFIE classifies all individuals under 15 as dependent, as well as those aged 15-17 (inclusive) who are not employed more than 30 hours a week. The child does not need to be directly related to the respondent eg, nieces, nephews, grandchildren, foster children can be included if the respondent is acting as their parent. Child dependency is only determined for children living in the same household as the respondent.

Imputation is also carried out to fill in missing data for key variables. More information about SoFIE is available on the Statistics NZ website.[10]

Our preliminary analysis of the raw assets and liabilities data revealed some inconsistencies and probable errors in the data. In a small number of cases, it was relatively clear what the intended values were and in these cases we applied an edit. This had an immaterial effect on the estimates of total assets and liabilities.[11]

4.2 Comparison of SoFIE and aggregate data from the Reserve Bank

Table 4 summarises the estimates of total household assets and liabilities from SoFIE and compares these to the aggregate estimates from the RBNZ. All population estimates from SoFIE have been inferred by applying the sampling weights provided by Statistics New Zealand and relate to the year ending September 2004.[12] The RBNZ data relates to calendar years and, for comparison purposes, we have estimated a September year by adding three-quarters of the 2004 estimate to one-quarter of the 2003 estimate.

There are some key differences between the coverage of the RBNZ data and the SoFIE data. As noted in Section 3.2, the RBNZ data excludes a range of assets that are covered by SoFIE. But on the other hand, RBNZ data will include assets and liabilities held by non-residents and individuals living in non-private dwellings.

SoFIE data appears to have systematically underestimated the level of assets and liabilities for the year ending September 2004. Total household debt estimated from SoFIE was considerably lower than household debt recorded in the RBNZ aggregate data; it fell between 17% and 29% below with 95% confidence. This was due to the lower housing debt estimate from SoFIE, which was between 23% and 34% below the RBNZ estimate with 95% confidence. The value of housing assets was also lower in SoFIE (by about 20%) and overall, SoFIE estimated between 12% and 22% less net housing wealth.

Property values reported in SoFIE were generally registered valuations,[13] some of which were a few years old. Given the rapid growth in house prices between 2000 and 2004, there is reason to expect that the valuations will tend to underestimate market value for the year ending September 2004. For this reason, reported property values were adjusted using Territorial Local Authority indices obtained from Quotable Value NZ, which take into account sales over the relevant period.[14] The RBNZ estimate of the value of property assets held by households is derived by RBNZ, also using QVNZ data.[15] The component of the difference between the SoFIE and RBNZ estimates of the total value of property assets that is due to measurement is therefore likely to be small.

Therefore, the underestimate of property assets will be partly due to differences in coverage. In particular, the treatment of assets and liabilities held in family trusts will be particularly important for property. The total value of residential property in family trusts

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10 http://www.stats.govt.nz/NR/exeres/D8603CF9-77D4-4592-B1FE-090B82F563FC.htm

11 Specifically, the edits increased the estimate of property assets by 0.7% and mortgages by 0.8%.

12 Cross sectional household weights have been used.

13 Rateable values are asked for the following types of properties: owner-occupied dwellings, rental property, holiday homes and other residential property in NZ. Expected sale price is asked for overseas property and timeshares.

14 This adjustment was made by Statistics NZ at our request.

15 http://www.rbnz.govt.nz/keygraphs/1689413.html

and mortgages on these properties will be included in the RBNZ estimates of property assets and liabilities held by households, but not in the SoFIE estimates of property assets and liabilities.[16] Similarly, SoFIE does not include property assets owned, and mortgages owed, by non-residents, but estimates of these items are included in the aggregate data. Overseas property held by NZ residents is covered by SoFIE, but not included in the RBNZ aggregates; however the total value of these properties is relatively small.[17] These factors suggest that we would expect the SoFIE estimates of property assets and mortgages to be below the RBNZ estimates.

As SoFIE tends to underestimate assets more broadly (eg, non-housing assets are underestimated by about 30%), it is probable that non-response bias is playing a role. It is possible that high net worth households have been underrepresented in SoFIE (perhaps they are harder to track down), but in the absence of administrative data on household wealth, it is not possible to confirm this.

These factors may affect our analysis of household debt and debt servicing costs. To the extent that debt not covered by SoFIE impacts on households (eg, mortgages on properties in family trusts would fall to households in most cases[18]), then debt levels and debt servicing ratios may be underestimated. It is also conceivable that the characteristics of households that are responsible for mortgages on properties in family trusts differ from those who are not. If this is the case, then our models that attempt to explain variation in debt levels and debt servicing relative to income may give biased estimates of the coefficients.

The effect of non-response bias on debt and debt servicing ratios is a little more difficult to understand as it depends on how well Statistics NZ's calibration has been able to adjust for this. If those who don't respond tend to have higher (or lower) debt levels than those who do *with the same observable characteristics,*[19] then calibration is unlikely to have corrected for the bias in average debt levels, despite Statistics NZ's non-response adjustment. Overall, it seems more likely that our estimates of average debt and debt servicing ratios are underestimates than overestimates; but whether this affects the number at the extreme end of the distribution with "problem" debt is difficult to say.

[16] Assets held in family trusts are not able to be attributed to respondents (except for the portion still owing to the respondent if they are in the process of gifting an asset) and mortgages held by family trusts are not included in the data at all.

[17] Less than 2% of the gross value of property assets recorded in SoFIE comes from overseas residential property.

[18] Except in cases where the trust contains assets that earn sufficient income to cover the mortgage repayments.

[19] Specifically, the characteristics that Statistics NZ have chosen to calibrate their population totals to eg, targets for age and sex totals will certainly be included.

Table 4 - Comparison for year ending September 2004

		SoFIE $Billion	RBNZ[1] $Billion	SoFIE - RBNZ
Assets	Housing	332[2]	414	-20%
	Financial	103	150	-31%
	Subtotal	435	564	-23%
	Business[3]	115	na	
	Durables[4]	106	na	
	Total	656	na	
Liabilities	Housing	73	102	-28%
	Non-housing	19	19	5%
	Total	92	120	-23%
Net wealth	Housing	259	313	-17%
	Financial	84	132	-36%
	Subtotal[5]	343	444	-23%
	Total	564	na	

[1] RBNZ data is for calendar years. Converted to September year by taking ¼ of 2003 and ¾ of 2004.
[2] Reported property values (generally registered valuations) were adjusted using Territorial Local Authority indices from QVNZ.
[3] The business assets category includes farms, orchards, commercial property such as a factory or shop.
[4] Durables consist of motor vehicles, leisure equipment, household items, and miscellaneous assets such as art.
[5] Excluding the SoFIE categories of Business & Durables.

Source: SoFIE wave 2, Statistics New Zealand; RBNZ

We turn now to the distribution of debt by major categories. Tables 5 and 6 break the total value of debt into mortgages, student loans, bank and credit card debt, and other debt. The proportion that each type contributes to the value of total debt is shown for each age group. Overall, mortgage debt contributed 69% to total debt held by non-partnered individuals and 82% of total debt held by couples in the year ending September 2004. The percentage varies by age group but, with the exception of young singles where 60% of debt is estimated to have been student loans, mortgages represented the majority of all debt.

Table 5 – Composition of debt by age group for non-partnered individuals

Age group	Mortgage	Student loan	Bank & credit card	Other debt	Total debt ($m)
18-24	21%	60%	3%	15%	2,000
25-34	64%	15%	6%	15%	6,000
35-44	81%	2%	7%	9%	6,000
45-54	77%	2%	7%	14%	5,000
55-64	82%	1%	9%	9%	2,000
65+	67%	1%	16%	17%	<500
Total	69%	12%	7%	13%	21,000

Source: SoFIE wave 2, Statistics New Zealand

For the 65+ group, although the proportion of debt that was bank, credit card and other debt appears to have been relatively high for both non-partnered individuals and couples, the average amounts held were relatively low. The high proportions of these categories reflect the relatively low mortgage debt and student debt in this age group.

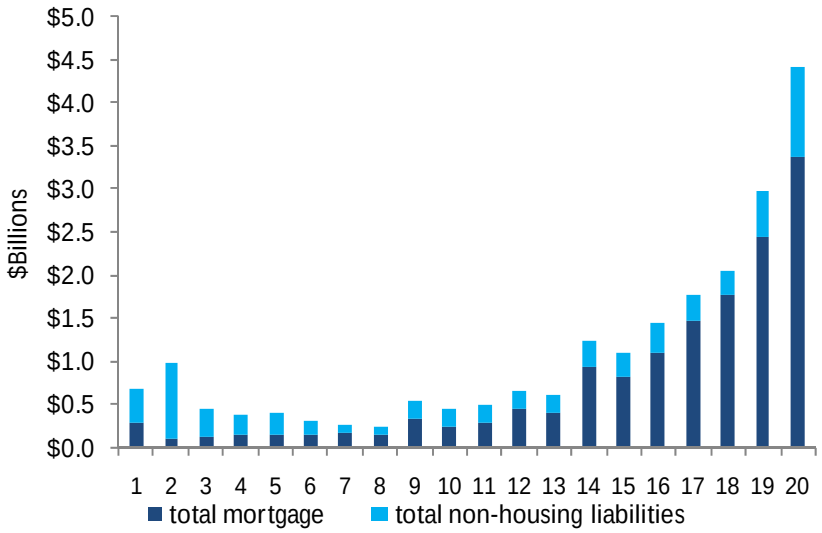
Table 6 – Composition of debt by age group for couples

Age group	Mortgage	Student loan	Bank & credit card	Other debt	Total debt ($M)
18-24	88%	6%	1%	5%	3,000
25-34	77%	6%	5%	11%	11,000
35-44	83%	1%	6%	9%	25,000
45-54	85%	0%	6%	8%	22,000
55-64	77%	0%	9%	13%	9,000
65+	69%	0%	11%	19%	1,000
Total	82%	2%	6%	10%	71,000

Source: SoFIE wave 2, Statistics New Zealand

Figures 8 and 9 illustrate the estimates of total debt held by non-partnered individuals and couples by income vintile for the year ending September 2004. It is clear from these graphs that the holdings of debt were highly skewed. In fact, over half the total debt was held by either individuals or couples in the upper quartile of the income distribution.[20]

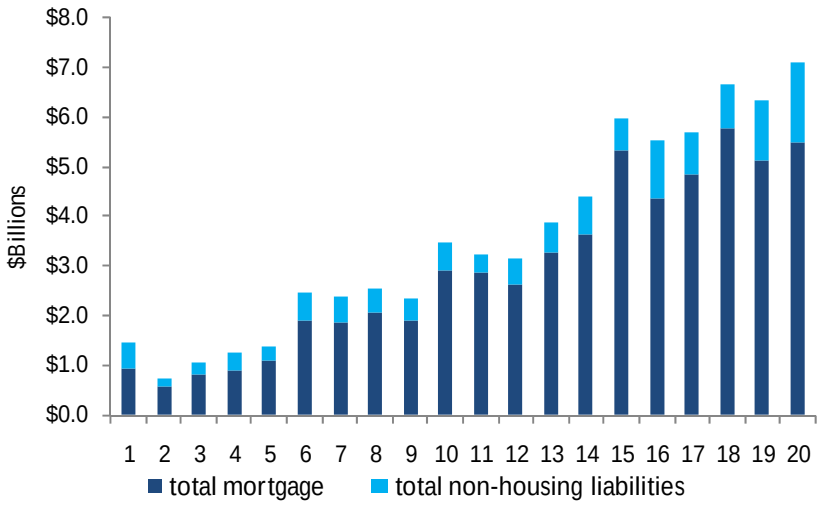
Figure 8 – Debt by income vintile for non-partnered individuals



Source: SoFIE wave 2, Statistics New Zealand

[20] Income vintiles, deciles and quartiles have been calculated for non-partnered individuals and couples separately.

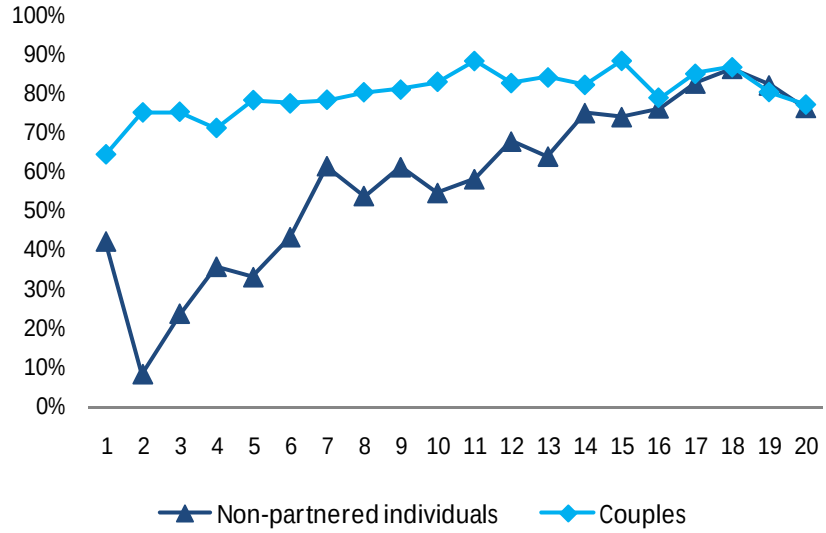
Figure 9 – Debt by income vintile for couples



Source: SoFIE wave 2, Statistics New Zealand

As indicated by Figures 8 and 9, Figure 10 confirms that, almost universally, mortgages represented the major part of family debt; the exception was non-partnered individuals in the lower part of the income distribution. Figure 10 also reveals that mortgages were a relatively constant proportion of debt across the income distribution for couples, but the proportion increased with income for non-partnered individuals.

Figure 10 – Mortgage debt as a percentage of total debt by income vintile for non-partnered individuals and couples



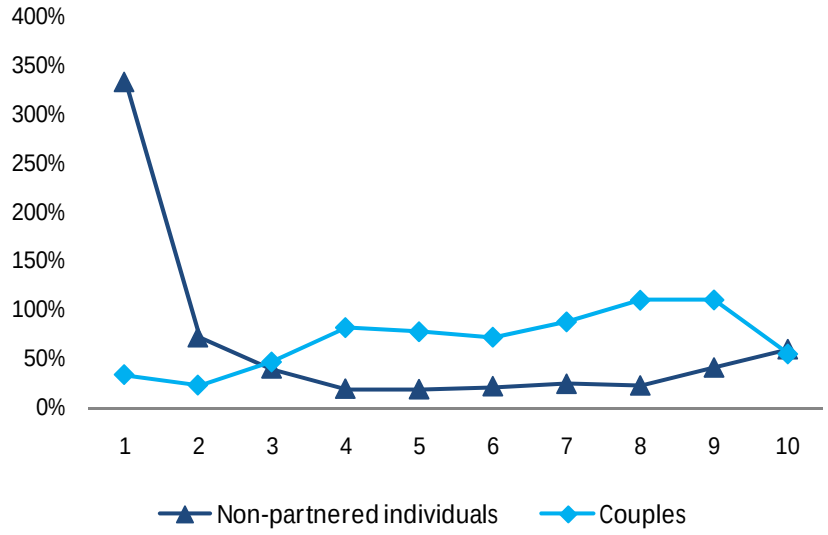
Source: SoFIE wave 2, Statistics New Zealand

Figure 11 displays the median value of debt as a percentage of income by income decile for the year ending September 2004.[21] The overall median value of debt as a percentage of income was 37% for non-partnered individuals and 74% for couples. However, the distribution of the debt to income ratio was highly skewed; the average value of debt as a

[21] Note that the figure and corresponding summary statistics are based on individuals that report debt and positive incomes. These results therefore exclude those who report debt but zero or negative income, which will include some with student loans.

percentage of income was 290% for non-partnered individuals and 350% for couples. The striking feature in Figure 11 is that debt levels tended to be very high relative to income for non-partnered individuals in the bottom income decile, with a median value of 330%. This is largely a reflection of the presence of some very low incomes, noting that all individuals in the bottom income decile had incomes less than $6,000 in 2003-04. Some of the individuals in this category had student loans of multiple times their income, and, as their earnings were below the threshold for repayments (which was around $17,000 in 2004), they would not have been incurring any debt servicing costs on their student loan. Further, their incomes are likely to rise when they complete their studies and so their debt to income ratios will tend to fall.

Figure 11 – Debt as a percentage of income for non-partnered individuals and couples; income decile medians



Source: SoFIE wave 2, Statistics New Zealand

Table 7 indicates that couples were more likely to have debt than non-partnered individuals for all age groups. Overall, 82% of couples had debt and 64% of non-partnered individuals had some form of debt. As well as being more likely to hold debt, couples tended to have much higher levels of debt than non-partnered individuals of similar age. Couples with debt had a median level of $46,000; non-partnered individuals with debt had a median level of $8,000. For both couples and non-partnered individuals, the medians increased with age to peak at 35-44 for couples (with a median level of $85,800) and at 45-54 for singles (with a median level of $16,000) declining thereafter to be lowest for those over 65.

However, Table 7 conceals the fact that there was considerable variability in debt levels *within* age groups. Figures 12 and 13 plot the key percentiles of debt by age group. It is clear that the dispersion was much greater over the middle of the age distribution for both non-partnered individuals and couples. Both the level of debt and its variability were lower for young and old. A feature of the distributions is the skewness; for both non-partnered individuals and couples, the median level of debt was appreciably lower than the mean. Half of those with debt had levels below the median (the 50th Percentile) but there were some people with very high levels of debt.

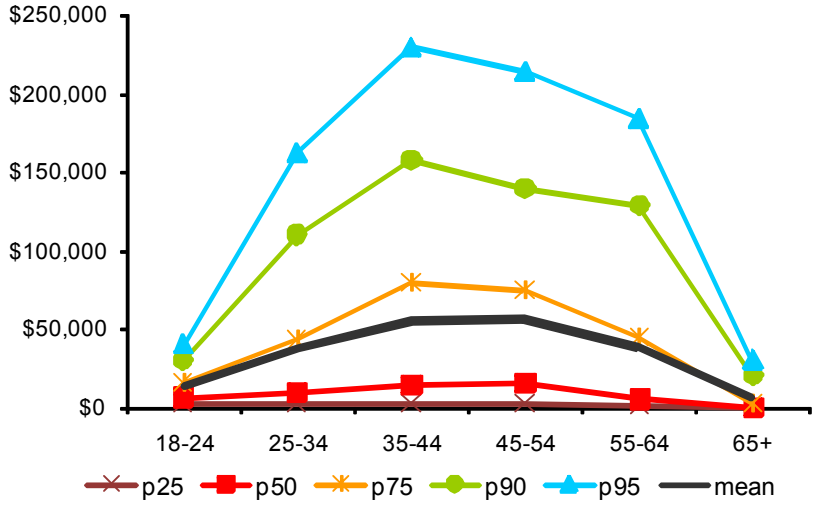
Table 7 – Number and proportion holding debt and median value

Type of debt	Age group	Non-partnered individuals			Couples[2]		
		No. with debt in category[3]	Share of age group	Median[4] value ($)	No. with debt in category	Share of age group	Median value ($)
Mortgage debt	18-24	6,100	2%	74,500	3,800	16%	154,000
	25-34	37,300	20%	80,000	61,900	47%	125,000
	35-44	50,500	34%	80,000	130,900	62%	120,000
	45-54	42,200	38%	66,000	124,600	60%	105,000
	55-64	22,000	23%	47,000	60,900	40%	71,000
	65+	8,200	5%	20,000	13,700	9%	32,000
	All age groups	166,300	17%	70,000	395,800	45%	109,000
Student loan debt	18-24	112,400	41%	10,000	9,000	38%	10,500
	25-34	52,100	27%	10,000	38,300	29%	15,000
	35-44	14,400	10%	8,000	22,500	11%	10,000
	45-54	5,400	5%	9,000	8,400	4%	11,000
	55-64	1,600	2%	5,000	1,700	1%	7,000
	65+	<1,000	<1%	S[5]	<1,000	<1%	S
	All age groups	186,000	19%	10,000	80,500	9%	12,000
Credit card / bank account debt	18-24	85,400	32%	500	12,200	51%	1,100
	25-34	97,900	51%	1,000	93,500	71%	2,000
	35-44	74,500	50%	1,200	155,400	73%	2,600
	45-54	56,300	51%	1,500	136,700	66%	2,500
	55-64	38,500	41%	1,000	97,500	64%	1,800
	65+	41,600	24%	400	64,100	43%	900
	All age groups	394,200	40%	900	559,300	64%	2,000
Other debt[1]	18-24	91,700	34%	2,300	17,400	73%	2,100
	25-34	72,500	38%	3,100	71,300	54%	4,600
	35-44	48,200	32%	2,000	98,400	46%	4,000
	45-54	35,400	32%	2,000	76,800	37%	3,000
	55-64	15,500	16%	2,000	34,000	22%	2,800
	65+	9,200	5%	1,000	12,100	8%	2,000
	All age groups	272,500	27%	2,400	310,100	35%	3,500
Total debt	18-24	188,900	70%	7,000	21,600	90%	12,100
	25-34	148,300	78%	10,000	123,900	94%	50,100
	35-44	112,400	75%	15,300	199,300	94%	85,800
	45-54	84,400	77%	16,000	181,500	88%	78,300
	55-64	54,300	57%	6,000	116,700	76%	22,800
	65+	50,600	29%	600	73,800	49%	1,300
	All age groups	639,000	64%	8,000	716,800	82%	46,000

[1] Other debt consists of personal bank loans, finance company loans, hire purchase, other debts of $100 or more
[2] For couples, debt of both partners is combined
[3] Estimated number with debt in each category are individually rounded to the nearest thousand and may not add to totals
[4] Median values are conditional on having debt in the category
[5] S signals that the cell value was suppressed due to small sample size

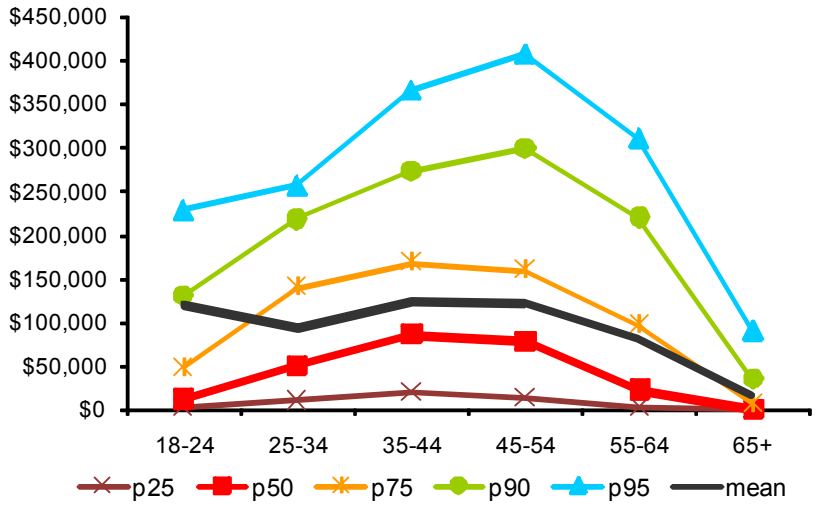
Source: SoFIE wave 2, Statistics New Zealand

Figure 12 – Percentiles of liabilities for non-partnered individuals by age



Source: SoFIE wave 2, Statistics New Zealand

Figure 13 – Percentiles of liabilities for couples by age



Source: SoFIE wave 2, Statistics New Zealand

4.3 Factors associated with the level of family debt

This section summarises the findings from our analysis of the variation in debt levels across families. We estimated basic regression models to test whether certain characteristics could be identified as being significantly related to variation in debt levels. The purpose of the models was to identify associations in the data and they are not intended to be used for prediction. Note that it is possible that they may suffer from presence of various forms of endogeneity, as it is difficult to account for this with one cross section of data.[22]

[22] Endogeneity is a term given to problems that occur when the explanatory variables in the model are affected by the dependent variable and/or other unobservable variables that also affect the dependent variable. When endogeneity is present, the estimated coefficients may be biased.

Models were estimated for non-partnered individuals and couples separately with the log of debt as the dependent variable. Singles and couples who reported no debt were excluded from the models. The general form of the regression models is given by:

$$\ln(\text{Debt}) = f(\text{Age, Ethnicity, No. children, Migrant status, Education, Health, Region, Assets, Income, Income source, Employment, Marital status, Home ownership}) + \varepsilon$$

in which the log of debt is associated with a set of explanatory variables and an error term (ε). Ordinary Least Squares (OLS) was used to estimate the coefficients.[23] Selection models were considered but we were unable to find a variable in the dataset that was theoretically related to the choice to have debt but not related to the level of debt.[24]

Many of our explanatory variables were themselves correlated. Examples are: home ownership and assets; age and income; employment and income. While this does not affect the overall fit of the model to the data, it can reduce the precision of the estimated coefficients on the correlated variables and make them difficult to interpret. The coefficient on a variable is usually interpreted as the effect of a unit change in that variable on the dependent variable, holding all other variables constant. In the presence of multicollinearity, this interpretation is less valid. For example, in our dataset, there were very few home owners in the lower part of the asset distribution. Given this data, it would have been unreasonable to expect the models to untangle the home ownership and asset level effects. It is therefore not sensible to think of the coefficient on home ownership as the effect on debt due to becoming a home owner, independent of asset levels. In this case, it is the simultaneous change in home ownership and asset levels that is associated with a change in debt levels, and the actual effect is likely to be larger than that implied by the coefficient on home ownership.

Table 8 and Table 9 present a summary of the factors that were found to be associated significantly, in a statistical sense,[25] with either a higher or lower level of debt.[26] A finding of statistical significance is not particularly meaningful on its own and so, in order to quantify the effect of each significant factor, marginal effects were computed. The marginal effect measures how the model's estimate of total debt changes in response to a change in one of the explanatory variables, while all other variables are held constant.[27] As an example, consider the first factor, age, listed in Table 8. The mean age of all non-partnered individuals in the sample was 37.5 years. The marginal effect is given for the average age plus 10 years.[28] The estimated level of debt in 2003-04 for a person aged 47.5 is $3,867 lower than for one aged 37.5 when all other variables are held at their sample mean values. Although the marginal effects have been calculated holding all

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[23] Median regressions were also estimated but it was not possible to correctly account for the sampling weights (using Stata) and so the results have not been reported.

[24] In order to fully identify the coefficients in the model, it is preferable to have a variable appearing in the selection equation that doesn't appear in the final regression. In the absence of such a variable, the estimated coefficients tend to have very large standard errors (and are therefore imprecise).

[25] The criteria for significance was $p<=0.05$ but many of the variables are significant at the 1% level.

[26] Detailed regression results are provided in the Appendix Tables A.1 and A.2.

[27] Many of our explanatory variables are categorical with more than one category eg, ethnicity can be European, Maori/Pacific or other. The marginal effects for these variables are estimated relative to a base category. For the ethnicity example, the base category is European and when estimating the marginal effect for Maori, "other" is set to zero. All other variables are held constant at sample mean values to estimate the marginal effects.

[28] Ten years was used to generate an effect comparable in magnitude to other marginal effects. A one year increase would have the effect of reducing debt by $425. Note that the marginal effect on debt is non-linear in the coefficients and so the ten year effect is not equal to ten times the one year effect. Furthermore, the effects also depend on the point at which they are evaluated.

other factors constant, as noted earlier, the presence of collinear variables means that they should be interpreted cautiously.

The regression model for non-partnered individuals accounted for 33% of the variation in (log) debt. The largest statistically significant marginal effect was estimated for home owners relative to renters, where home owners were estimated to have had about $17,000 more debt, all else constant. Asset decile effects were also relatively large; being in the top 3 deciles was associated with debt levels being about $10,000 higher than decile 1, all else constant.[29] Having a degree was associated with debt levels of about $8,000 more than those with no qualifications, and being separated or divorced was found to be associated with debt levels being about $4,000 and $5,000 higher respectively than those who had never married. All else constant, those unemployed or out of the labour force were estimated to have total debt some $3,000 lower than those in employment.[30] Income effects were not particularly significant although being in income decile 5 or 6 was associated with slightly lower levels of debt than deciles 1 ($3,000 lower) and 10 ($5,000 lower). The smallest significant marginal effects were school qualifications relative to no qualifications ($2,000 more debt) and for males relative to females ($1,000 more debt). Ethnicity, number of dependent children, migrant status, self reported health, region of residence and maximum source of income were all found to have statistically insignificant coefficients, meaning that there was insufficient evidence to reject the hypothesis that they had no effect on debt after controlling for the other variables in the model.

The regression model for couples (see Table 9) accounted for 40% of the variation in (log) debt. The largest statistically significant marginal effects were estimated for asset deciles 9 and 10, at $42,000 and $55,000 respectively relative to decile 1; further, a large significant effect of about $30,000 relative to deciles 4 to 8 was also estimated for decile 10. The home ownership effect for couples was estimated at $27,000. Relative to couples in the bottom income decile, those in deciles 9 and 10 tended to have about $20,000 more debt.[31] A large positive effect of was estimated for couples where both partners were employed, at about $25,000 relative to couples where one partner was unemployed and the other was out of the labour force[32], $16,000 relative to couples where both were out of the labour force, and $5,000 relative to couples where one partner was employed. The model estimated a negative age effect over the relevant range, where couples with an average age of 54.5 tended to have about $17,000 less debt than couples with an average age of 44.5. Couples with at least one partner identifying as Maori/Pacific tended to have about $7,000 more debt than European couples.[33] The ethnicity classification associated with the lowest debt levels was both partners classifying as "other" (ie, non-European and non-Maori/Pacific) with a marginal effect of -$8,000 relative to European, and about -$15,000 relative to couples where at least one partner is Maori/Pacific. Couples living in the South Island outside of Canterbury tended to have debt levels that were about $10,000 less than couples living in Auckland or Waikato. Distinct marital status effects were identified: both partners responding as never married was associated with $8,000 less debt than married couples; couples with other mixtures of marital status tended to have levels of debt that were about $12,000 higher than married

[29] Those in the top 3 asset deciles also have significantly more debt than those in deciles 2 to 6, although the effects are smaller.

[30] Relative to employment, the unemployment effect and the out-of-the-labour-force effect were both statistically significant, but insignificantly different from each other.

[31] With the income decile 10 effect also statistically significant relative to deciles 2, 3 and 6 and decile 9 significant relative to 2 (although these effects are smaller).

[32] Although only 1% of couples were in this category.

[33] The marginal effects on debt for both partners Maori/Pacific ($6,000) and one partner Maori/Pacific and the other European ($8,000) were not significantly different from each other.

couples. Education, maximum source of income, number of dependent children, migrant status, self reported health status and years in employment all had statistically insignificant effects.

Table 8 – Point estimates of statistically significant marginal effects on debt level for non-partnered individuals

	Marginal effect at sample means[1]	Sample mean or proportion
Relative to mean age (debt=$8,658)		
Age + 10 yrs	-$3,867	37.5
Relative to female (debt=$8,146)		
Male	$1,178	45%
Relative to renters (debt=$5,358)		
Home owner	$16,957	34%
Relative to bottom asset decile (debt=$5,031)		
Asset decile 4	$1,986	11%[2]
Asset decile 5	$1,783	11%
Asset decile 7	$7,117	10%
Asset decile 8	$9,425	10%
Asset decile 9	$8,777	10%
Asset decile 10	$11,196	10%
Relative to bottom income decile (debt=$10,239)		
Income decile 5	-$3,219	9%
Income decile 6	-$3,428	10%
Relative to no qualifications (debt=$6,640)		
School or vocational qualifications	$1,890	54%
Degree	$7,859	17%
Relative to employed (debt=$9,430)		
Unemployed	-$3,676	3%
Not in labour force	-$2,261	26%
Relative to never married (debt=$7,743)		
Divorced	$4,939	14%
Separated	$3,691	10%

[1] Marginal effects on debt are non-linear and have been evaluated relative to the stated category, holding all other variables at sample means. The base estimate of debt level to which the marginal effect relates appears in brackets. The criteria for statistical significance is <0.05.

[2] The share in each asset and income decile does not necessarily equal 10% because the deciles are calculated over all non-partnered individuals, including those without debt.

Table 9 – Point estimates for statistically significant marginal effects on debt level for couples

	Marginal effect at sample means[1]	Sample mean or proportion
Relative to mean sum of age (debt=$29,504)		
Sum of age + 20 yrs	-$16,866	89.0
Relative to renters (debt=$14,396)		
Home owners	$27,170	68%
Relative to bottom asset decile (debt=$8,499)		
Asset decile 2	$3,847	10%
Asset decile 3	$15,411	10%
Asset decile 4	$26,868	10%
Asset decile 5	$27,539	10%
Asset decile 6	$26,985	11%[2]
Asset decile 7	$27,806	10%
Asset decile 8	$26,875	10%
Asset decile 9	$42,433	10%
Asset decile 10	$55,480	10%
Relative to bottom income decile (debt=$20,683)		
Income decile 7	$9,322	11%
Income decile 8	$15,876	11%
Income decile 9	$17,574	11%
Income decile 10	$23,496	10%
Relative to both European (debt=$28,725)		
Both Maori/Pacific	$6,415	8%
Both Other	-$8,180	6%
Maori-European mix	$8,057	9%
Relative to Auckland (debt=$32,743)		
Other South Island	-$10,071	11%
Relative to both employed (debt=$32,968)		
Both out of the labour force	-$16,473	9%
One Employed	-$5,456	23%
Unemployed/not-in-labour-force mix	-$24,898	1%
Relative to both married (debt=$29,845)		
Neither partner ever married	-$7,807	12%
Other marital status mix	$11,774	7%

[1] Marginal effects on debt are non-linear and have been evaluated relative to the stated category, holding all other variables at sample means. The base estimate of debt level to which the marginal effect relates appears in brackets. The criteria for statistical significance is <0.05.

[2] The share in each asset and income decile does not necessarily equal 10% because the deciles are calculated over all couples, including those without debt.

5 To what extent are families over-indebted?

High levels of debt are not necessarily a problem, provided adequate income is available for debt servicing. In this section we attempt to estimate the proportion of non-partnered individuals and couples who appeared to have problem debt in 2003-04. This required us to define a critical level of debt above which it could be regarded as a "problem", recognising there will be a certain inevitable arbitrary element in whatever threshold is chosen. We define those with debt levels exceeding this threshold as "vulnerable". We construct a measure that relates debt servicing obligations to income and present the basic descriptive statistics (Section 5.1). In Section 5.2 we explore the factors associated with high levels of debt servicing in relation to income. In Section 5.3 we take a further step to narrow in on those most at risk, recognising that many of those high debt servicing costs relative to their income have the ability to reduce these costs if they become unaffordable. We introduce a measure to estimate the proportion of families most "at risk" due to high debt servicing obligations that takes into account overall net wealth. We classify those with high debt servicing costs in relation to their income *and* negative net wealth as most at risk. In Section 5.4 we repeat the analysis under the assumption that those with student loans have a corresponding asset that is at least equal to the value of the student loan. In the final section (5.5) we analyse the impact of unexpected shocks on our estimate of the proportion of the population most at risk.

5.1 Estimating the extent of problem debt

Clearly for many individuals and families, a substantial level of debt is not necessarily a cause for concern. As shown in Figures 12 and 13, debt levels vary markedly with the stage of the life cycle. Whether or not this is regarded as "problem debt" will depend in large part on the income available for debt servicing. If the cost of servicing debt is within a family's available income after meeting basic living costs, we would not consider this family to have problem debt.

Ideally, we would have been able to identify those respondents who had problem debt by comparing expenditure on debt servicing with income after basic living expenses. However, as SoFIE does not collect data on expenditure, we estimated debt servicing costs from data on liabilities and used this to construct a ratio of debt servicing to income, which we used for our problem debt classification. In most of our analyses, family units with debt servicing costs in excess of 30% of their gross income were classified as having problem debt. In selected tables, 40% has also been used. While these are arbitrary cut-offs, they help to identify families that could potentially have had trouble servicing their reported levels of debt, or who could have easily fallen into this category were they hit by an unexpected increase in interest rates or a sudden decrease in income. As families with higher incomes tend to be able to cope with both higher debt servicing costs and higher debt servicing costs relative to income, we repeated some analyses for those in the lower half of the equivalised income distribution.

We estimated the cost of servicing debt from reported debt levels and assumptions about the cost of different types of debt. We applied the following assumptions to broad debt categories: 7.4% has been applied to mortgage debt (only the interest component is included in the estimate of debt servicing costs); student loan debt servicing is calculated as 10% of an individual's earnings above $15,964 (rate and earnings thresholds consistent with 2004 legislation); 10% was applied to bank overdrafts; and 20% was

applied to all other personal liabilities such as hire purchase and credit card debt. A debt servicing to income ratio was calculated at the family unit level by dividing our estimate of debt servicing costs by total income reported (from all sources before tax).

An important caveat is that the interest rates listed above have been assumed to apply to all non-partnered individuals and couples who hold that particular type of debt. For example, all those who had hire purchase and credit card debt are assumed to have paid the same rate of interest. To the extent that interest rates varied across individuals, debt servicing costs will have differed from those that we estimated. If the errors are non-random with respect to debt levels and/or income, our estimates of the proportion of families with problem debt may be biased.[34]

Table 10 contains summary statistics for debt servicing costs as a percentage of income for non-partnered individuals and couples in 2003-04. All means, medians and percentages in this table are conditional on having debt servicing costs and positive reported income.

The mean debt servicing as a percentage of income for non-partnered individuals is estimated to have been 15.8% in 2003-04. The 95% confidence limits were 10.4% and 21.1%. This average was raised by a few highly indebted individuals, such that the median was much lower at 3.6%. In other words, of all non-partnered individuals with positive income and debt servicing costs in 2003-04, half were estimated to have had debt servicing obligations at or below 3.6% of their income. About 6.2% of singles with debt servicing costs and positive reported income were estimated to have had debt servicing percentages over 30%.

Non-partnered individuals in the lower half of the equivalised income distribution had an average debt servicing percentage of 21.8%. For this group, the upper 95% confidence limit for the mean is only slightly below our problem debt threshold of 30%. This means that there is insufficient evidence to reject that the true average for debt servicing costs as a percentage of income for non-partnered individuals in the lower half of the equivalised income distribution was 29%. However, the distribution for this group was even more skewed than the distribution for the full sample of non-partnered individuals and so the median is a better measure of central tendency; here the median was only 2.7%. Some 7.6% of this low income sub group had debt servicing percentages above 30%.

For couples, average debt servicing as a percentage of income was estimated to be 14.3%, which was insignificantly different than that for non-partnered individuals. However, the median appears to be notably higher at 6.8% compared with 3.6% for non-partnered individuals. The percentage with debt servicing costs exceeding 30% of income was also higher, at 8.1% compared with 6.2%. Restricting the sample to those couples who had equivalised income below the median resulted in a distribution that was more skewed, with average debt servicing as a percentage of income increasing to 20.1%, and the median reducing slightly to 5.5%. The percentage with debt servicing costs exceeding 30% of income increased to 12.1%.

[34] Moreover, if the errors are non-random with respect to variables that we have considered in our models, the coefficients may be biased.

Table 10 – Debt servicing costs as a percentage of income: a summary[1] [2]

			Estimate	95% Confidence limits	
				Lower	Upper
All singles	Debt serving as a percentage of income	Median	3.6%		
		Mean	15.8%	10.4%	21.1%
	Percentage with debt servicing over 30% of income	%	6.2%	5.5%	7.0%
Low income singles	Debt serving as a percentage of income	Median	2.7%		
		Mean	21.8%	14.5%	29.0%
	Percentage with debt servicing over 30% of income	%	7.6%	6.5%	8.7%
All couples	Debt serving as a percentage of income	Median	6.8%		
		Mean	14.3%	12.8%	15.7%
	Percentage with debt servicing over 30% of income	%	8.1%	7.3%	8.9%
Low income couples	Debt serving as a percentage of income	Median	5.5%		
		Mean	20.1%	15.9%	24.3%
	Percentage with debt servicing over 30% of income	%	12.1%	10.4%	13.7%

[1] Complete results are given in Appendix Tables A.3 and A.4.
[2] The estimates of the ratio of debt servicing to gross income applies to those individuals and couples who were estimated to have debt servicing costs and who have recoded income that is positive. This is the sample used for the debt servicing ratio regression models (see footnote 40).

Source: SoFIE wave 2, Statistics NZ; Treasury

Figures 14 and 15 present the distributions of the debt servicing ratio implied by the SoFIE sample for 2003-04 using a logarithmic scale.[35] However, for ease of interpretation, the summary statistics (M=mean and p50=median) marked on the plots relate to the untransformed distribution. The vertical line indicates the 30% cut-off, so those lying to the right had debt servicing obligations that exceeded 30% of their gross income. These distributions are conditional on positive reported income and positive debt servicing costs.

The most striking feature of Figure 14 is the modest proportion of those that had debt servicing exceeding 30% of income. Figure 15 displays the distribution for those families whose equivalised income fell below the median. Here the share of couples paying more than 30% increased to around 12%.

[35] The distribution of the actual debt servicing ratio can be viewed in the appendix as Figure A.1. The distribution of the actual debt servicing ratio is highly skewed, with most observations bunched around zero with a very long tail.

Figure 14 – Distribution of log debt servicing to gross income ratios for non-partnered individuals and couples

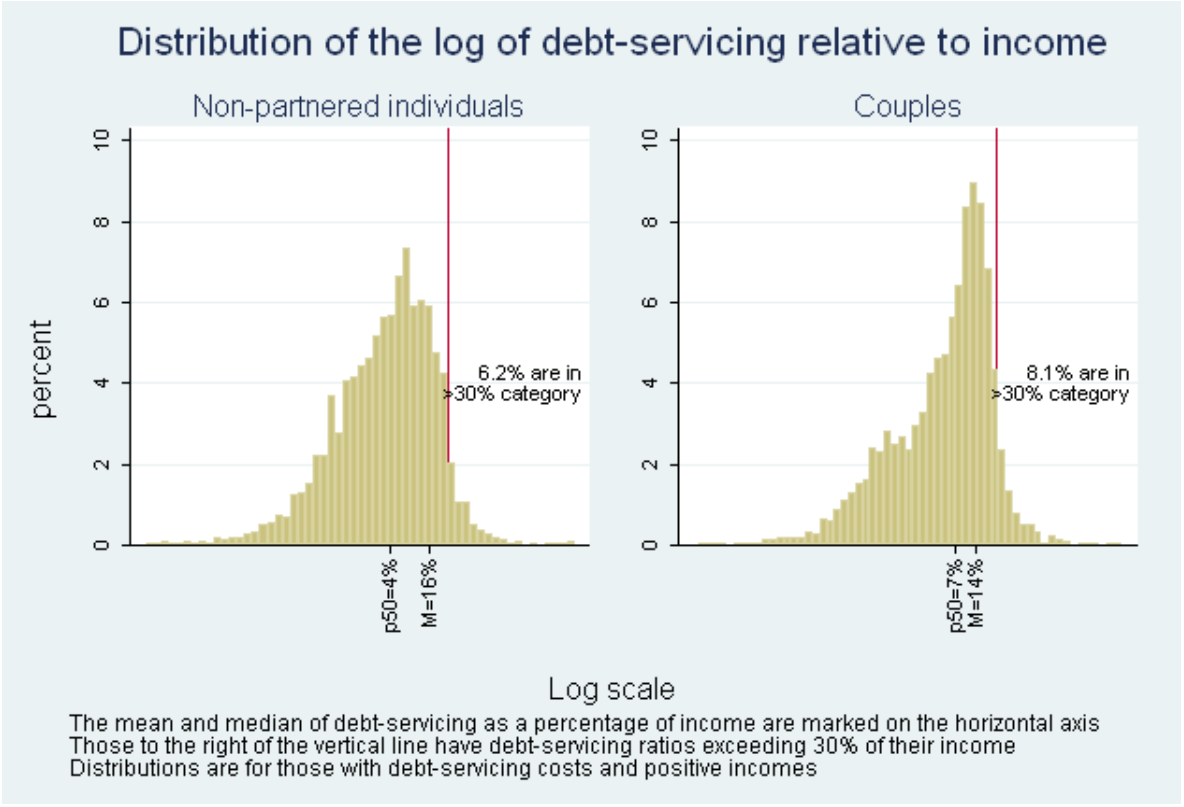
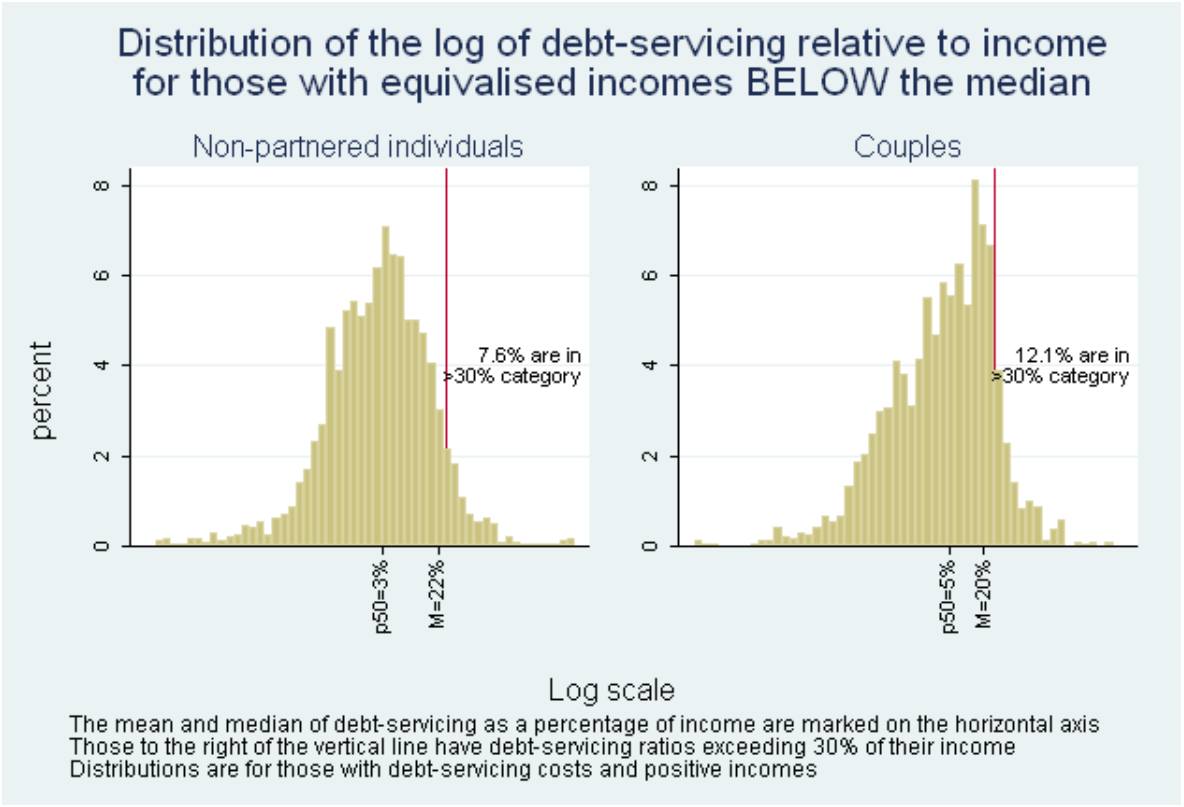


Figure 15 – Distribution of log debt servicing to gross income ratios for non-partnered individuals and couples with incomes below the median income



Source for both figures: SoFIE wave 2, Statistics NZ; Treasury

More detailed descriptive statistics for debt servicing ratios and the percentages that had debt servicing costs exceeding 30% of income are given in Appendix Tables A.3 and A.4. Note that these statistics are purely descriptive and they relate to the year ending September 2004. For non-partnered individuals, groups that had relatively high median ratios and relatively high percentages with debt servicing exceeding 30% of income were characterised by: low income; high assets; middle age; sole parents; degree-holders; those living in Auckland or Waikato; home owners; employed; maximum source of income from "other" ie, not from earnings or government; divorced or separated. A relatively high median ratio did not always coincide with a higher percentage with debt servicing costs over 30% of income. For instance, although median ratios were also relatively high in the top equivalised income deciles, debt servicing costs exceeded 30% for a relatively small share of individuals. For example, deciles 7 to 10 had higher median ratios than decile 1 but the percentage with debt servicing costs exceeding 30% of income was considerably lower (only 4.5% for deciles 7 to 10 compared with 22% for decile 1). Further, these percentages may overestimate the number of individuals with high equivalised incomes who had problem debt. As noted earlier in this section, those with relatively high incomes are more likely to be able to cope with higher debt servicing ratios and using a cut-off of 30% of income may be inappropriately low.

For couples, the groups that tended to have relatively high median debt servicing ratios and relatively large shares paying more than 30% of their income in debt servicing were typically characterised by: low to middle income; high assets; middle age; ethnicities other than European or Maori/Pacific; migrants; having dependent children; educated and being home owners. Again, couples with relatively high equivalised incomes tended to have relatively high median levels of debt servicing in relation to income, but the share where this percentage exceeded 30% was relatively low (6.5% for those above the median compared with 34% for those in decile 1).

5.2 Factors associated with debt servicing costs relative to income

In this section we summarise our more detailed analysis of factors associated with the variation in debt servicing costs relative to income across family units.

The analysis uses two types of regression models to quantify relationships between a wide range of characteristics and debt servicing costs relative to income: Ordinary Least Squares (OLS) models, and Logistic models.[36] With the exception of income, which is excluded from these models,[37] the explanatory variables are identical to those used in our debt regressions in Section 4.3. As was the case for the debt regressions, these models may suffer from endogeneity and they are not intended to be used for prediction.

The form of the OLS model follows, in which the log of ratio of debt servicing to income was the dependent variable:

$$\text{Log (debt servicing/income)} = \beta_0 + \sum_i \beta_i X_i + \varepsilon$$

[36] Median regressions were also estimated but it was not possible to correctly account for the sampling weights (using Stata) and so the results have not been reported.

[37] Income is used in the construction of the dependent variable and so has not been used as an explanatory variable.

where the X_i are the set of characteristics, the β_i are the regression coefficients, and ε is the error term. On the basis of the regression coefficients have estimated the marginal effect on the debt servicing ratio of changes in characteristics, and the change in the probability that debt servicing costs exceeded 30% of income.[38]

We also estimated logistic regression models where the dependent variable was a binary variable taking the values of 0 or 1 depending whether the individual or couple has a debt servicing costs of less than or greater than 30% of their income. In this regression we were seeking to identify the characteristics that were associated with the probability that debt servicing exceeds 30% of income.

$$\text{Logit}^{39}\ (\text{probability that debt servicing/income} > 0.3) = \lambda_0 + \sum_i \lambda_i X_i + \varepsilon$$

In both models the data sets were restricted to those having both debt servicing costs and positive income.[40] The regression models were re-estimated excluding those who had equivalised income above the median, but as the results were broadly consistent they have not been reported. We initially included various interaction terms in the models, but found none that significantly improved the fit of the models to the data.

The factors that were found to be associated with the likelihood of having debt servicing costs in excess of 30% of income are summarised in Table 11 for non-partnered individuals and Table 12 for couples. Full details of the regression results are given in Appendix Tables A.5 and A.6. As with the debt regressions in section 4.3, many of our explanatory variables were themselves correlated and so the estimated coefficients and marginal effects should be treated with caution.

The first column of Tables 11 and 12 reports the sample mean or proportion of each of the significant variables. For example 36% of non-partnered individuals were home owners in 2003-04. In the next two columns we report the results of the OLS model. The first of these is the marginal change in debt servicing as a percentage of income associated with a change in the value of an explanatory variable relative to the stated base category. For example, non-partnered individuals in the highest asset decile tended to have debt servicing costs that were 2.9 percentage points more of their income than those in the lowest asset decile, holding all other variables at their sample means. The second OLS column reports the marginal change in the probability of having debt servicing costs greater than 30% of income for one category relative to another. For example, those not in the labour force were 3.2% percentage points less likely to have debt servicing costs greater than 30% of their income than individuals who were employed, holding all other variables at their sample means.

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38 The predicted probability of an observation having a debt servicing ratio above any given level can be obtained from the results of the debt servicing ratio OLS regression. Under the standard OLS assumptions, the residuals are normally distributed with zero mean and variance σ^2. Therefore the probability of an observation with characteristics represented by x having a debt servicing ratio exceeding 0.3 is $F[(\beta x - \ln(0.3))/\sigma)]$, where F is the standard normal cumulative distribution function with mean of zero and standard deviation of 1. Ravallion (1996) argues that there is no need for a binary response estimator when the underlying "latent" variable is actually observable. In fact, replacing the observable variable with a binary variable is essentially throwing away information about the variation in the dependent variable.

39 The transformation is the log of the ratio of the probability of a positive outcome to a negative outcome, ie, the log of the odds. The logit transformation results in a dependent variable that can be linearly related to the explanatory variables.

40 These are the requirements for our dependent variable (the log of debt servicing to income) to be defined. Those reporting non-positive income represented 1.8% of non-partnered individuals with debt and 0.3% of couples with debt. Further, a debt servicing ratio cannot be logged for those with debt who have no debt servicing costs. Respondents in this situation were those with student loans (but no other debt) who had earnings below the threshold for repayments. They represented 7.2% of the sample of non-partnered individuals with debt, and 0.6% of the sample of couples with debt.

Table 11 – Statistically significant marginal effects[1] on debt servicing relative to income and the probability of debt servicing exceeding 30% of income for non-partnered individuals

	Sample mean or proportion	Least squares regression		Logistic regression
		Marginal change in debt servicing as a percentage of income	Marginal change in the probability that debt servicing exceeds 30% of income	Marginal change in the probability that debt servicing exceeds 30% of income
Relative to mean age				
Age + 10 yrs	38.5	-1.2%	-4.0%	
Relative to renters				
Home owner	36%	4.3%	12.2%	
Relative to bottom asset decile				
Asset decile 3	10%	0.7%	2.3%	
Asset decile 4	10%	1.1%	3.5%	
Asset decile 5	11%	1.7%	5.6%	
Asset decile 6	10%	0.9%	3.1%	
Asset decile 7	11%	2.8%	8.6%	4.6%
Asset decile 8	11%	3.3%	10.2%	7.7%
Asset decile 9	11%	2.9%	9.1%	10.9%
Asset decile 10	10%	2.9%	8.9%	15.8%
Relative to European				
Non-euro, non-Maori/Pacific	5%			6.4%
Relative to Auckland				
Canterbury	15%	-0.7%	-2.1%	
Relative to Employed				
Unemployed	3%			5.6%
Not in labour force	24%	-1.0%	-3.2%	
Relative to maximum income from earnings				
Maximum income from government	27%	1.3%	3.8%	5.1%
Maximum income from other source	12%			4.6%
Relative to never married				
Divorced	15%	2.2%	6.4%	
Separated	11%	1.2%	3.7%	2.4%

[1] Marginal effects are non-linear and have been evaluated relative to the stated category, holding all other variables at sample means.

Table 12 – Statistically significant marginal effects[1] on debt servicing relative to income and the probability of debt servicing exceeding 30% of income for couples

	Sample mean or proportion	Least squares regression		Logistic regression
Relative to mean sum of age		Marginal change in debt servicing as a percentage of income	Marginal change in the probability that debt servicing exceeds 30% of income	Marginal change in the probability that debt servicing exceeds 30% of income
Sum of age + 20 yrs	89.1	-2.5%	-7.2%	
Relative to renters				
Home owners	68%	3.5%	9.5%	
Relative to bottom asset decile				
Asset decile 2	10%	0.8%	2.5%	0.9%
Asset decile 3	10%	2.7%	7.8%	3.7%
Asset decile 4	10%	4.2%	11.7%	5.9%
Asset decile 5	10%	4.0%	11.2%	5.8%
Asset decile 6	11%	3.9%	10.9%	8.8%
Asset decile 7	10%	3.7%	10.4%	6.0%
Asset decile 8	10%	3.3%	9.5%	11.6%
Asset decile 9	10%	5.1%	14.0%	17.2%
Asset decile 10	10%	6.1%	16.2%	28.7%
Relative to both European				
Both Maori/Pacific	8%	1.7%	4.4%	
Maori-European mix	9%	1.3%	3.3%	
Relative to both born in NZ				
Both migrants	14%	1.5%	3.8%	7.4%
Relative to no qualifications				
Both degree	9%	-1.4%	-3.9%	
Relative to both employed				
Both Unemployed	<1%			19.9%
Both out of the labour force	9%	-1.9%	-5.4%	
One Employed	23%			2.0%
Unemployed/not-in-labour-force mix	1%	-3.7%	-10.7%	
Relative to maximum income from earnings				
Maximum income from government	9%	3.1%	7.6%	6.4%
Maximum income from other source	23%			2.7%
Relative to married couple				
Neither partner ever married	12%	-1.3%	-3.5%	
Other marital status mix	7%	1.8%	4.5%	1.7%

[1] Marginal effects are non-linear and have been evaluated relative to the stated category, holding all other variables at sample means.

The OLS regression for non-partnered individuals explained 20% of the variation in the log of the debt servicing ratio. The characteristics found to have statistically significant effects on debt servicing relative to income and the probability that debt servicing exceeds 30% of income[41] include most of those that were associated with debt levels outlined in section 4.3. Owning a home had the highest estimated marginal effect on debt servicing as a percentage of income (4.3 percentage points) and was associated with a 12.2 percentage point increase in the probability of these costs exceeding of 30% of income. Positive effects were also estimated for having relatively high levels of assets (about 9 percentage points on the probability for the top 4 deciles relative to decile 1),[42] and being separated or divorced (3.7 and 6.4 percentage points more likely than those in the never married category respectively[43]). A negative age effect was estimated (the 10 year effect on the probability was estimated to be about -4 percentage points at the mean). Employment was not as strongly related to debt servicing ratios as it was to debt but a small significant effect was identified relative to the not in the labour force category (3.2 percentage points on the probability). Those reporting income from the government as their dominant source tended to have slightly higher debt servicing costs relative to income than those whose dominant source was earnings,[44] translating into a 3.8 percentage point effect on the probability and this factor was not found to be significantly associated with debt levels. A small negative effect was identified for Canterbury relative to Auckland and Waikato (estimated to be -2.1 percentage points relative to Auckland). Note that although males were found to have slightly higher levels of debt, there was no strong evidence of a gender effect on debt servicing in relation to income.[45] Similarly, although an education effect was identified for non-partnered individuals in the debt regression, there is less evidence of an education effect on debt servicing relative to income.

For couples (Table 12), the OLS regression explained 26% of the variation in the log of the debt servicing ratio. Again, similar characteristics were found to significantly affect both debt and debt servicing relative to income. High asset levels and home ownership had relatively large marginal effects. Couples in asset deciles 9 and 10 tended to have debt servicing costs in relation to their income some 5 percentage points higher than those in decile 1 and were estimated to be 15 percentage points more likely to have debt servicing exceeding 30% of their income;[46] home owners tended to have debt servicing costs making up 3.5% more of their income and were estimated to be 9.5 percentage points more likely to have these costs exceeding 30% of their income. A negative age effect was identified, with a 20 year effect (10 years on average) on the probability of debt servicing exceeding 30% of income of -7.2 percentage points at the mean. The estimated ethnicity and marital status effects had the same signs as they did in the debt regression. Couples that had at least one partner identifying as a Maori or Pacific Island were estimated to be about 4 percentage points more likely to have debt servicing costs over 30% of their income than European couples.[47] Relative to married couples, the marginal

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41 Because of the normality assumption underlying the OLS model, the factors that are estimated to be associated with high debt servicing ratios are also associated with higher probabilities of having debt servicing ratios exceeding 0.3. The residuals from the log debt servicing regression were consistent with being from a normal distribution with zero mean and constant variance.

42 Decile 8 had the largest estimated marginal effect and it was significant relative to deciles 1-4 and 6. In addition with being significant relative to decile 1, being in deciles 7, 9 and 10 was associated with significantly higher ratios than deciles 2 and 3.

43 Being divorced was also associated with a significantly higher ratio than married (some non-partnered individuals reported being married) and widowed. Although note that the separated and divorced effects were not significantly different from each other.

44 Also significantly higher than those whose dominant source was "other" ie, not earnings or government.

45 The p-value was 0.11 on a positive coefficient for males relative to females in the debt servicing ratio regression, and even less significant in the logistic regression (p=0.29).

46 Distinct asset decile effects were identified for deciles 1 and 2 (ie, significantly different from each other and from all deciles above) with 1<2<rest although only asset decile 10 was associated with significantly higher ratios than decile 3.

47 The effects for both Maori/Pacific and one Maori/Pacific and the other European were not significantly different from each other.

effects on the probability for never married couples and those in the "other" category were estimated at -3.5 and 4.5 percentage points respectively. A positive employment effect of 5.4 percentage points on the probability was estimated relative to couples where both partners were out of the labour force.[48]

Characteristics identified as significantly related to the debt servicing percentage of income but not to debt were country of birth, dominant income source and education. Couples where neither partner is born in NZ tended to be 3.8 percentage points more likely to have debt servicing percentages over 30%.[49] A positive marginal effect of 7.6 percentage points was estimated for couples whose dominant source of income was marked as government relative to those who had earnings as the dominant source.[50] Couples where both partners had a degree were estimated to be 3.9 percentage points less likely to have debt servicing costs exceeding 30% of their income than no-degree couples.

A notable difference between the associations implied by the regression models and those seen in the descriptive statistics is the age relationship. The regression models imply that the debt servicing to income ratio tended to fall with age for both non-partnered individuals and couples over the relevant range[51] when other factors are controlled for, although the basic cross tabulations suggested that ratios peaked in middle age. This is in part due to the correlation between age and asset levels with younger respondents tending to report lower asset levels, with the models attributing the low observed ratios at young ages to relatively low levels of assets. Another difference is that in the case of couples, the regressions associated double degrees with a lower probability of having debt servicing costs over 30% of income, whereas the cross tabulations revealed slightly higher probabilities for double-degree couples. A likely explanation is that the higher observed average ratio is due to double-degree couples being more likely to have had both partners employed and/or had higher asset levels, both of which were associated with higher ratios and that the underlying education effect was negative.[52]

For both couples and non-partnered individuals the logistic regression model gave broadly similar results, although neither home ownership effect nor age effects were identified as significant and the asset decile effects were larger.[53] It is notable however that there are only a limited number of variables that were identified as having had significant effects in both models and in general their impact is not large. The overall ability of these models to explain variations in debt servicing ratios, or the probability that the ratio is higher than 30%, is fairly limited. We conclude that despite allowing for the effects of a wide range of variables describing the characteristics of an individual or a couple, it is likely that unobserved characteristics are playing an important role. A person's attitude to risk, or the values acquired from their parents and grandparents almost certainly influence the extent to which a person takes on debt. Unfortunately, for these and possibly many other

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48 And couples with both employed were estimated to have been 10.7 percentage points more likely to have debt servicing costs over 30% of income than couples where one partner was unemployed and the other was out of the labour force.

49 And also significantly higher than couples where one was born in NZ but the other wasn't.

50 And those whose dominant income source was government also had a significantly higher probability of having debt servicing over 30% of income than those whose main source was "other" ie, non-earnings and non-government.

51 We have modelled a quadratic age effect, which suggests a peak at 18.5 for singles and at an average age of 19.4 for couples.

52 The OLS-derived negative effect for double-degree couples is in fact consistent with the basic statistics (the unconditional average for double-degree couples was 12.5% compared with the average of 14.3%). However, the logistic regression model directly estimated the probability of having high debt servicing ratios; and estimated a negative coefficient despite a slightly higher than average share of double-degree couples observed to have debt servicing costs over 30% of income (8.6% compared with 8.1%). Although the coefficient isn't quite statistically significant at the 5% level, is in fact negative at the 10% level (p=0.07).

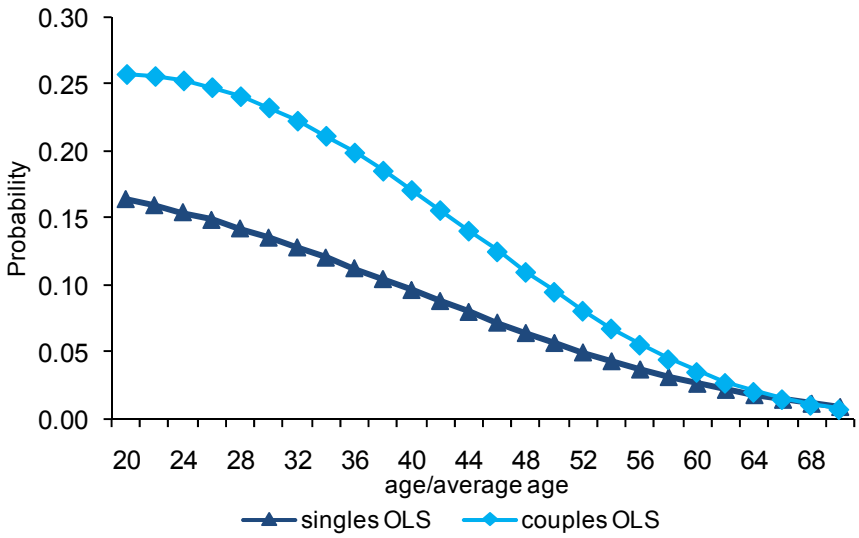
53 The logistic regression for non-partnered individuals had an R-squared statistic of 0.15 and for couples it was 0.16.

variables that may in fact be important, we have no measures. The best solution for this kind of unobserved heterogeneity is to analyse longitudinal panel data. With subsequent waves of SoFIE we hope to be able to minimise the effect of unobserved characteristics not included in the set of variables (X_i) in the models fitted in this section.

We conclude this section by presenting Figure 16, which shows the predicted probability of having debt servicing costs in excess of 30% of income by age for non-partnered individuals and couples in 2003-04. The probabilities are conditional in the sense that while age varies all other variables are held at their mean values. Note that, as age is correlated with many of our other explanatory variables, it is difficult to estimate a "pure" age effect. Nevertheless, there is a marked fall with age in the probability of having debt servicing costs exceed 30% of income. By the age of retirement, the likelihood of having high debt servicing is very low. However, caution is needed in extrapolating from these results as they are derived from a cross-sectional survey and do not incorporate cohort effects. For example, the outcome for a 60 year old individual in 2020 may not necessarily be the same as that of a 60 year old observed in 2003-04.

To the extent that the probabilities shown in Figure 16 are correlated with the measures of financial constraints as recorded in surveys of living standards, the results here are broadly consistent with the estimate of Valins (2004) that 15% of all households could be over indebted. Whether this means that they are "at risk" is the question we turn to in the next section.

Figure 16 – Estimated conditional probability of debt servicing costs exceeding 30% of income by age



[1] Probability estimates have been derived from the OLS models for the log of debt servicing to income (see footnote 40).

[2] Probabilities are conditional on all non-age variables taking sample-mean values.

Source: SoFIE wave 2, Statistics NZ; Treasury

5.3 Who is at risk?

Debt is considered to be a problem when debt servicing costs are greater than income after basic living costs. Those with problem debt but positive net wealth have the choice of eliminating their debt by selling some assets. Some of those with negative wealth have

sufficient income to continue to service their debt. Therefore, we have classified those who have *both* high debt servicing in relation to their income (i.e. problem debt), and in addition, have negative wealth as being most "at risk".[54] As explained in Section 5.1, we do not have sufficient information to identify those respondents with debt servicing costs exceeding income after basic living costs. For this reason, we used an estimate of debt servicing costs relative to income for our problem debt classification.

The results of estimating the proportion of family units at risk in 2003-04 are given in Table 13 for non-partnered individuals and Table 14 in the case of couples.[55] In the case of non-partnered individuals, 34.2% of those with debt were estimated to have had negative wealth. Debt servicing obligations exceeded 30% of income for 6.5%; and exceeded 40% of income for 4.5%. However, being at risk is defined as having debt servicing above 30% (or 40%) of income and at the same time having negative net wealth. The proportion with debt classified as at risk was quite low; less than 2% using either the 30% or 40% threshold for problem debt. The proportion at risk was highest for the 18-24 year old age group, with 3.6% classified as at risk in 2003-04.

For couples with debt, 8.5% had negative wealth and 7.9% were estimated to have had debt servicing obligations that exceeded 30% of their gross income. Less than 1% of couples with debt were estimated to have been at risk in 2003-04.

Table 13 – Percentage of non-partnered individuals with debt who were at risk

Age	Number with debt	Percentage with negative wealth	Percentage with debt servicing over 30% of income	Percentage with debt servicing over 30% of income and negative wealth	Percentage with debt servicing over 40% of income	Percentage with debt servicing over 40% of income and negative wealth
18-24	188,700	60.6%	4.9%	3.6%	4.2%	3.3%
25-34	148,100	40.1%	5.7%	1.6%	3.7%	1.2%
35-44	111,800	21.2%	8.3%	0.9%	4.8%	0.6%
45-54	83,700	14.1%	10.4%	1.5%	7.5%	0.6%
55-64	53,700	9.7%	8.4%	0.8%	4.8%	0.5%
65+	50,600	6.2%	2.1%	0.5%	1.5%	0.3%
Total	636,700	34.2%	6.5%	1.9%	4.5%	1.5%

(a) Excludes those with negative reported income.

Source: SoFIE wave 2, Statistics NZ; Treasury

[54] Of course, some families will have negative wealth and problem debt but sufficient assets to reduce debt to a level that they could service with their available income. For this analysis they have been classified as vulnerable. This implies that our estimates are conservative and may overstate the proportion vulnerable in 2003-04.

[55] Although not included in the debt servicing regression models described in section 5.2, those with debt but zero reported income are included in the analysis in this section; 0.8% of the sample with debt reported zero income. About half of those with debt but zero income are calculated to have positive debt servicing costs, resulting in an undefined debt servicing ratio. We have classified those in this category as having problem debt on the grounds that they have insufficient income to service their debt (ie, they are in the over 30% and over 40% categories).

Table 14 – Percentage of couples with debt who were at risk

Age	Number with debt(a)	Percentage with negative wealth	Percentage with debt servicing over 30% of income	Percentage with debt servicing over 30% of income and negative wealth	Percentage with debt servicing over 40% of income	Percentage with debt servicing over 40% of income and negative wealth
18-24	21,600	38.2%	4.3%	1.6%	4.3%	1.6%
25-34	123,000	20.3%	5.6%	0.8%	1.8%	0.4%
35-44	195,600	8.0%	10.3%	1.0%	5.4%	0.8%
45-54	178,500	3.8%	9.7%	0.7%	5.9%	0.5%
55-64	115,600	2.4%	7.5%	1.0%	5.5%	0.6%
65+	73,400	1.9%	2.8%	0.0%	1.9%	0.0%
Total	707,700	8.5%	7.9%	0.8%	4.5%	0.6%

(a) Excludes those with negative reported income.

Source: SoFIE wave 2, Statistics NZ; Treasury

5.4 Taking account of student loans

There is an important aspect of the measurement of net wealth that warrants clarification, as it influences the estimates of the number of families at risk. A relatively high proportion of all non-partnered individuals and couples under the age of 35 were deemed to have had negative net wealth. The figure is most striking in the case of individuals aged 18-24, where the proportion with negative net wealth was estimated to be about 60%.

Negative net wealth implies that the measured value of all liabilities exceeds the measured total sum of assets. Of course, there could well be measurement errors, but it is very unlikely that systematic over-reporting of liabilities and under-reporting of assets could alone explain such a high incidence of negative wealth.

Further analysis reveals that for 45% of individuals and 28% of couples who had negative wealth, their net wealth became positive when their student loan was excluded from their liabilities. This raises two further issues. In the first place, while the survey records student loans as a liability, no corresponding asset is recorded. This is in contrast to say housing, where both the liability (the outstanding mortgage) and the asset (the gross value of the property) enter the calculation of net wealth.[56] Without an offsetting asset net wealth will be systematically underestimated for those with a student loan.[57] The implication is that the estimates of those at risk through high levels of debt servicing and negative net wealth will be overstated. This suggests that the results in Tables 13 and 14 should be treated as upper bounds.

Those who have invested in education can expect to have higher life time earnings than those who have not. They have acquired an asset (referred to as human capital) and like all other assets it is expected to generate a stream of benefits. Drawing on the work of Scobie, Gibson and Le (2005) we can illustrate this as follows. Take as an example a Pakeha female aged 25 with a university degree. She can expect to have a lifetime

[56] This of course does not preclude the possibility that a drop in house prices could lead to negative net housing wealth.

[57] Actually, net wealth will be underestimated for all who expect future earnings, but in general, individuals find it hard to borrow against future earnings. Currently, the student loan scheme is the only way in which individuals can explicitly borrow against their future earnings and so we have only offset student debt as it is unrealistic to offset other kinds of debt with human capital.

income some $375,000 higher in present value terms than a 25 year old Pakeha female with only high school qualifications. The present value of expected future earnings until age 65 represents one measure of the asset denoted human capital. In the example above, $375,000 represents the *additional* human capital she can expect from her investment in education. Clearly, even if this person had borrowed $45,000 (the 95th percentile of all loan balances in 2007), her ability to repay this from her additional earnings would not be in doubt. She would however, be recorded in SoFIE as having substantial negative net wealth. Further, in the event that she is still completing her studies or yet to join the labour force as a graduate, she could well have a very low or no recorded income. This will mean that she is included in the estimates of being at risk because of the combination of her negative net wealth and low income. Yet no such "problem" exists in reality, once the true value of her assets and her ability to repay her debt from lifetime income are correctly accounted for.

In order to recognise the importance of human capital as an asset, we recomputed the estimates of the proportion at risk taking into account that those with student loans have invested in education to acquire additional human capital. We imposed the assumption that the present value of their expected additional future earnings (over and above what they would have expected with only school qualifications) exactly offsets the student loan that they reported in the survey. Put simply, this assumes that the acquired asset is equal in value to their investment.[58]

Referring again to the example cited above, the 25 year old female with a degree could expect to have additional human capital worth eight times the large liability she was assumed to have acquired; more than sufficient to cover her student loan. It seems reasonable to assume that those with student loans expect to increase their stock of human capital by at least the amount of their student loan. Therefore our assumption that the value of the asset is just equal to the debt, (ie, a ratio of 1:1) should give a conservative estimate of average net wealth for those recording student loans.

But for our purposes, it is not average net wealth with which we are concerned. Rather, it is the proportion at risk, so the tails of the distribution are more relevant than the average. This raises the question of the effect of our assumption on the estimated proportion at risk. It may seem that the assumption will overstate the reduction in the proportion at risk if we completely offset student loans as inevitably there will be a few individuals whose additional future earnings will not cover their loan. But although it is likely that there will be some individuals whose *actual* net investment in human capital will be negative, to calculate current net wealth it is the current value of the asset that is relevant. With any investment in capital, the present value of the future stream of benefits that it will provide is uncertain and yet it has a market value at any point in time equal to the expected value of this stream of benefits. Whether the investment pays off is another issue, which is relevant for investment in any asset, be it housing, financial or other assets. Therefore, our 1:1 assumption should not overstate the number whose net human capital moves from negative to positive when we offset their student loan, provided those individuals expect a return from their investment.

Tables 15 and 16 show how offsetting student loans in this way affected our estimate of the percentage that had negative wealth and the percentage at risk in 2003-04. Table 17 and Table 18 show the effect of this on average net wealth for the group whose recorded wealth was negative in 2003-04.

[58] Note that we only observe the outstanding loan in the data, which may be less than the initial investment. The effect of this on our results is to make them more conservative.

Table 15 reveals an 46% reduction in our estimate of the number of non-partnered individuals with negative net wealth in 2003-04 when student loans are offset, taking the percentage with negative wealth down from 34% to 19%. Table 17 shows that the effect was to increase the estimate of average net wealth for this group from -$11,300 to -$1,300. The biggest reduction in the estimated proportion with negative wealth occurred in the 18-24 age group, where the percentage fell by 60%, down to 24%, and the estimate of average wealth increased from -$11,300 to $600. Through its effect on wealth, offsetting student loans also had an impact on the estimate of the number with negative wealth and high debt servicing costs, particularly for those aged 18-24; for this age group, the estimate of the percentage with negative wealth and debt servicing costs in excess of 30% of income fell from 3.6% to 2.5%. The percentage with negative wealth and debt servicing costs in excess of 40% of income fell from 3.3% to 2.3%.

The corresponding results for couples are displayed in Table 16 and Table 18. The results show a 28% fall in our estimate of the number with negative wealth in 2003-04 when student loans are offset by a corresponding asset. The effect was an increase in average net wealth for those reporting more debt than assets from -$34,800 to -$23,600. The effect was largest for those under 35, where the estimate of the percentage with negative wealth fell by about 36% and the estimate of average net wealth increased from around -$20,000 to -$6,000. For couples however, student loans were a very small share of their total debt (2% overall) in contrast to non-partnered individuals (at 12%). As a consequence, offsetting student loans with a corresponding asset had very little impact on the share of couples who had both negative wealth and high debt servicing costs and so did not reduce the estimate of the percentage of couples with debt considered to have been at risk.

Table 15 – Effect of offsetting student loan debt on estimate of percentage of non-partnered individuals with debt who were at risk

	Percentage with negative wealth			Percentage with debt servicing over 30% of income and negative wealth		Percentage with debt servicing over 40% of income and negative wealth	
Age	Base including student loans	Excluding student loans	Percentage change	Base including student loans	Excluding student loans	Base including student loans	Excluding student loans
18-24	60.6%	24.1%	-60.2%	3.6%	2.5%	3.3%	2.3%
25-34	40.1%	23.6%	-41.1%	1.6%	1.4%	1.2%	1.1%
35-44	21.2%	17.8%	-16.0%	0.9%	0.8%	0.6%	0.4%
45-54	14.1%	11.9%	-15.6%	1.5%	1.5%	0.6%	0.6%
55-64	9.7%	9.3%	-4.1%	0.8%	0.8%	0.5%	0.5%
65+	6.2%	5.8%	-6.5%	0.5%	0.5%	0.3%	0.3%
Total	34.2%	18.5%	-45.9%	1.9%	1.5%	1.5%	1.1%

(a) Excludes those with negative reported income.

Source: SoFIE wave 2, Statistics NZ; Treasury

Table 16 – Effect of offsetting student loan debt on estimate of percentage of couples with debt who were at risk

	Percentage with negative wealth			Percentage with debt servicing over 30% of income and negative wealth		Percentage with debt servicing over 40% of income and negative wealth	
Age	Base including student loans	Excluding student loans	Percentage change	Base including student loans	Excluding student loans	Base including student loans	Excluding student loans
18-24	38.2%	24.3%	-36.4%	1.6%	1.6%	1.6%	1.6%
25-34	20.3%	12.8%	-36.9%	0.8%	0.7%	0.4%	0.4%
35-44	8.0%	5.9%	-26.3%	1.0%	1.0%	0.8%	0.8%
45-54	3.8%	3.6%	-5.3%	0.7%	0.7%	0.5%	0.5%
55-64	2.4%	2.4%	0.0%	1.0%	1.0%	0.6%	0.6%
65+	1.9%	1.8%	-5.3%	0.0%	0.0%	0.0%	0.0%
Total	8.5%	6.1%	-28.2%	0.8%	0.8%	0.6%	0.6%

(a) Excludes those with negative reported income.

Source: SoFIE wave 2, Statistics NZ; Treasury

Table 17 – Effect of student loans on net wealth for non-partnered individuals with negative net wealth

Age	Number with negative wealth	Mean net wealth	Mean net wealth excluding student loans
18-24	114,300	-$11,324	$644
25-34	59,300	-$12,746	-$1,817
35-44	23,700	-$11,012	-$6,534
45-54	11,800	-$9,586	-$5,876
55-64	5,200	-$5,201	-$4,624
65+	3,100	-$3,431	-$2,965
Total	217,500	-$11,324	-$1,342

(a) Excludes those with negative reported income.

Source: SoFIE wave 2, Statistics NZ; Treasury

Table 18 – Effect of student loans on net wealth for couples with negative net wealth

Age	Number with negative wealth	Mean net wealth	Mean net wealth excluding student loans
18-24	8,300	-$21,319	-$6,080
25-34	25,000	-$19,884	-$5,595
35-44	15,700	-$43,572	-$32,948
45-54	6,800	-$87,799	-$85,906
55-64	2,800	-$43,543	-$42,525
65+	1,400	-$7,561	-$4,726
Total	59,900	-$34,806	-$23,634

(a) Excludes those with negative reported income.

Source: SoFIE wave 2, Statistics NZ; Treasury

5.5 Susceptibility of those with high debt servicing obligations to unexpected shocks

The survey data used in the analysis has been drawn from wave 2 of SoFIE and relates to the year ending September 2004. For the analysis in this section we have made adjustments to some of the income and wealth variables and altered relevant parameters (such as mortgage interest rates) in line with observed changes in macroeconomic conditions between the year ending September 2004 and June 2008.[59] In the absence of survey data for 2008, this approach provided a dataset from which the extent of debt problems in 2008 could be estimated.[60]

Our adjustment to earnings assumed an underlying earnings growth of 17%.[61] However, it is recognised that not all individuals will have had a growth in earnings equal to the average amount. Rather, there will be a distribution about that average. To reflect this we introduced a random shock to our estimate of each individual's permanent income.[62] While this is an important adjustment, it is possible that different types of people may be more or less likely to have experienced positive growth in earnings over the period. If the factors explaining changes in income since 2003-04 are also correlated with debt levels, then our adjusted estimates of the proportion of families in the "problem debt" and "at risk" categories may be biased.

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59 Property assets were multiplied by 1.4 (House Price Index compiled by QVNZ); mortgage debt was multiplied by 1.35 (RBNZ, Treasury); mortgage rate increased from 7.4% to 8.5% (RBNZ, Treasury).

60 Data for 2008 from wave 6 of SoFIE should be available by 2010.

61 Quarterly employment survey, Statistics NZ; Treasury BEFU08 forecasts.

62 This involved splitting reported income into a 'permanent' and a 'transitory' component, applying the average growth to permanent income and adding a random shock. The decomposition required a model for the degree of persistence in income. Hyslop (2000) analysed IRD annual income tax data for the five year period 1994-1998, and estimated that the proportion of the observed variance in log (market) income that was due to differences in permanent income was about 65%. Broadly speaking, we have used these estimates to decompose the variance in income reported in SoFIE into a 'permanent' component and an orthogonal 'transitory' component and to recover an estimate for permanent income. Permanent income was then adjusted for growth between 2004 and 2008. To complete the adjustment to income, we simulated an income shock by taking a random draw from a normal distribution with a mean of zero and variance equal to that implied by the variance decomposition, and added this to our estimate of underlying permanent income for 2008 for each observation (either non-partnered individuals or individuals in a couple). Note that we have assumed that the proportion of the variance in income that was estimated to be transitory over 1994 to 1998 can be applied to 2004 data.

We also allowed for the fact that house prices, mortgage levels and mortgage interest rates had changed between 2004 and 2008. However, we applied the same scale factors to all families. If the characteristics and relative debt levels of those who have taken out mortgages recently differ from mortgage holders in 2003-04, our estimates of the proportion at risk may be affected. For instance, although the aggregate gearing ratio for housing remained steady between 2003 and 2007, there is anecdotal evidence that, in some cases, banks were willing to lend at higher loan to value ratios over that period than in the past. Therefore our 2008 estimates may understate the number of families in the at risk category. Given the limitations of our adjustments to income and wealth, our estimates for 2008 might best be regarded as lower bounds.

Table 19 compares the baseline estimates for 2008 with estimates that apply to 2003-04. In the first instance, the estimate of the proportion with negative net wealth is little changed from 2003-04. For both non-partnered individuals and couples, the proportions facing debt servicing costs in excess of 30% or 40% of gross income are estimated to have doubled. This is the effect of higher mortgage interest rates and higher house prices that are likely to have led to more borrowing at higher rates.

Table 19 – A comparison of the baseline estimates for 2008 with the observed data for 2003-04

	2003-04	2008
Percentages of non-partnered individuals with debt		
Having negative net wealth	34.2%	34.0%
Having debt servicing more than 30% of income	6.5%	12.1%
Having both negative net wealth and debt servicing more than 30% of income	1.9%	1.8%
Having debt servicing more than 40% of income	4.5%	9.1%
Having both negative net wealth and debt servicing more than 40% of income	1.5%	1.5%
Percentages of couples with debt		
Having negative net wealth	8.5%	8.3%
Having debt servicing more than 30% of income	7.9%	18.4%
Having both negative net wealth and debt servicing more than 30% of income	0.8%	1.1%
Having debt servicing more than 40% of income	4.5%	12.7%
Having both negative net wealth and debt servicing more than 40% of income	0.6%	0.8%

(a) The observed 2003-04 data is based on a year ending September year, while the estimated results for 2008 are for a June year.

Source: SoFIE wave 2, Statistics NZ; Treasury

For non-partnered individuals there was little or no change in the percentage of those with debt who were deemed to be at risk; (i.e. paying more than 30% of their income in debt servicing and simultaneously having negative net wealth). However for couples the estimate of the percentage with negative net wealth and paying more than 30% of their incomes rose from 0.8% to 1.1%; or based on the numbers in 2003-04, we estimate that the number of couples at risk increased from about 6,000 to 8,000.

Table 20 summarises the results of varying mortgage rates and income on the estimate of the percentage of family units with debt who had high debt servicing costs and the percentage deemed to be at risk. A reduction in mortgage interest rates of 2 percentage points reduces the estimate of the number at risk by about 5% or 1,000 families. If this were to occur together with a 10% increase incomes, our results indicate that the number of families at risk could fall by about 12% or 2,300. Note that 2,300 families represent less than half a percent of the number of families with debt.

Table 20 – Effect of changes in interest rates and incomes

		Percentages of singles with debt		Percentages of couples with debt	
		With debt servicing more than 30% of income	Having both negative net wealth and debt servicing more than 30% of income	With debt servicing more than 30% of income	Having both negative net wealth and debt servicing more than 30% of income
Base (2008 from Table 19)		12.1%	1.84%	18.4%	1.12%
% point change in mortgage rates	-3%	8.2%	1.65%	11.6%	1.06%
	-2%	9.5%	1.73%	14.0%	1.08%
	-1%	10.7%	1.81%	16.3%	1.08%
	+1%	13.0%	1.84%	20.1%	1.14%
	+2%	13.8%	1.84%	22.4%	1.17%
	+3%	14.6%	1.86%	24.2%	1.19%
Percentage change in incomes	-20%	14.6%	2.18%	23.4%	1.32%
	-15%	13.9%	2.16%	21.9%	1.26%
	-10%	13.1%	1.96%	20.3%	1.19%
	-5%	12.5%	1.95%	19.2%	1.15%
	+5%	11.3%	1.80%	17.5%	1.10%
	+10%	10.7%	1.77%	16.5%	0.96%
	+15%	10.3%	1.74%	15.3%	0.96%
Mortgage rates down 2 percentage points and incomes up 10%		8.9%	1.67%	12.2%	0.95%

Source: SoFIE wave 2, Statistics NZ; Treasury

We have also estimated the possible impact of a fall in house prices holding other factors fixed (see Table 21). In a scenario where average nominal house prices fall 20% from their level in June 2008, our estimate of the percentage of couples with debt who have negative net wealth increases from 8.3% to 9.7%. As negative net wealth is not necessarily a cause for concern if the family can continue to meet its debt servicing obligations, we also estimate the effect on the percentage deemed to be most at risk (ie, having negative net wealth *and* paying more than 30% of income in debt servicing). Our estimate of the percentage deemed at risk increases from 1.1% to 1.9%, corresponding to approximately 5,000 families. In the same scenario, our estimate of the percentage of non-partnered individuals with debt deemed to be at risk increases from 1.8% to 2.6%, corresponding to about 5,000 non-partnered individuals.

While these estimates allow for random shocks to income between 2003-04 and 2008, they assume that incomes remain at levels estimated for 2008. Mortgage interest rates are also held fixed. At the time of writing, most economists were forecasting an increase in the rate of unemployment over the next two years and this would be expected to increase the number of families facing negative income shocks.[63] If the affected families include some of those with negative wealth whose debt servicing costs are pushed over the problem debt threshold of 30% of their income, this would increase the percentage at risk. On the other hand, any reduction in interest rates would reduce debt servicing costs and would be expected to reduce the percentage at risk. These effects partially offset.

However, these estimates do not allow for the possibility that new entrants into the housing market may have higher gearing ratios than we observe in the 2003-04 data, making them potentially more vulnerable to house price falls. As such, a fall in house prices may result in a larger increase in the number of families at risk than our results suggest.

Table 21 – Effect of changes in house prices

	Percentages of singles with debt		Percentages of couples with debt	
Percentage change in house prices	With negative wealth	Having both negative net wealth and debt servicing more than 30% of income	With negative wealth	Having both negative net wealth and debt servicing more than 30% of income
Base (2008)	34.0%	1.84%	8.3%	1.12%
-20%	35.2%	2.60%	9.7%	1.86%
-15%	34.6%	2.27%	9.3%	1.65%
-10%	34.4%	2.09%	8.8%	1.46%
-5%	34.1%	1.96%	8.6%	1.29%
+5%	33.9%	1.77%	8.2%	1.06%
+10%	33.8%	1.68%	8.1%	0.98%
+15%	33.8%	1.66%	8.0%	0.95%
+20%	33.8%	1.66%	7.9%	0.87%

Source: SoFIE wave 2, Statistics NZ; Treasury

[63] Although on average, nominal per capita disposable income forecast to increase.

6 Conclusions

The use of debt by households is a recognised method to allow consumption smoothing to even out short term fluctuations, deal with unexpected crises, and make lifetime investments in areas such as education, small businesses and housing. Borrowing for investments is an important mechanism for building a stock of assets as a basis for retirement income. Deregulation of financial markets has been accompanied by greater use of debt by New Zealand households. By some measures, New Zealand has a high level of household debt relative to other OECD countries. In contrast, debt levels in relation to income amongst lower income households are below those in other countries.

Recent trends in household debt (from 2002 to 2007) have raised some questions about whether there is a "debt problem". It is certainly the case that household liabilities have grown rapidly over this period, largely as a result of borrowing for housing. At the same time however, the increased value of housing has meant that assets have also increased, to an extent that net wealth both per capita and as a share of household incomes has increased to unprecedented levels. However, as much of these gains have been generated by the rise in property values over the 2002-2007 period, they stand to be at least partially retrenched due to the correction in house prices. A high proportion of housing in both the liabilities and assets of the household sector does increase the exposure to price changes.

Among non-partnered individuals, those who have relatively high asset levels, who own homes, are young, male, or divorced or separated, tended to have significantly higher levels of debt in 2003-04. For couples, factors associated with high debt levels were home ownership, high levels of assets, higher incomes, both partners employed, or identifying as Maori or Pacific Island.

The average debt servicing as a percentage of income was about 15%, with low income families being about 5 percentage points higher. However, these distributions were highly skewed by having a few highly indebted families. A better measure of central tendency is arguably the median. For couples this was 6.8% of income and for non-partnered individuals this was 3.6%.

Typically between 5 and 10% of families with debt had debt servicing costs greater than 30% of their gross income in 2003-04, a cut-off regarded as one indicator of potential over indebtedness. In this study we combined this criterion with also having negative net wealth. Those with positive net wealth are deemed to have a cushion in the event of a crisis and are therefore not at risk to the same extent. Less than 2% of non-partnered individuals and less than 1% of couples with debt had both negative net wealth and debt servicing obligations above 30% of their gross income in 2003-04. These people were potentially "at risk" due to their level of debt.

For non-partnered individuals, those deemed at risk were concentrated in the younger age groups. However, for many in this group, their negative net wealth was in large part an artefact of accounting. Their liabilities included student loans, yet no corresponding assets are recorded. An important contribution of this study was to adjust for this and re-estimate the proportion at risk. Based on a highly conservative assumption that the extra life time earnings will at least equal the value of the student loan, our estimate of the share of non-partnered individuals with negative wealth nearly halved, and the share at risk fell by over 20%.

The analysis presented in Sections 4 and 5 of this paper was based on data from the second wave of the Survey of Family, Income and Employment (SoFIE) that was collected over the one year period from 1 October 2003 to 30 September 2004. Clearly there have been changes in economic conditions since this period and it is possible that these changes have not only affected the level of assets and liabilities, but also the distribution of assets and liabilities with respect to various characteristics. Moreover, the proportions and characteristics of families in our "problem debt" and "at risk" categories may now be different than what we have estimated, with the proportions more likely to be higher than lower.

In part to compensate for this limitation we made some adjustments to reflect changes in macroeconomic conditions between the year ending September 2004 and June 2008. We adjusted both income and wealth data, along with the parameters used to estimate debt servicing costs (such as mortgage interest rates). However, in most cases the same scaling factors and parameters were applied to all families. One exception to this was earnings, where we introduced a random shock to recognise that there will be a distribution of income growth around the average. Although these adjustments are important, they will not fully capture the complex changes in the distribution of income and wealth since 2003-04. As such, our estimates of the proportion of families in the "problem debt" and "at risk" categories for 2008 might best be regarded as lower bounds. For non-partnered individuals there was little or no change in our estimate of the proportion with negative net wealth who also had debt servicing costs exceeding 30% of their income (ie, at risk). However for couples our estimate of the proportion at risk rose from 0.8% to 1.1% or based on the numbers in 2003-04, increased from about 6,000 to 8,000 families.

Currently, there is concern that falling house prices will leave some families who purchased recently with low deposits with negative equity. Using the broader measure of net wealth, we estimated that a further 20% decline in house prices from their level in June 2008 would increase the percentage of couples with debt who have negative net wealth from 8.3% to 9.7%. However, negative net wealth is not necessarily a cause for concern if the family can continue to meet its debt servicing obligations. A fall in house prices of this magnitude increases our estimate of the share of couples with debt deemed to be at risk (ie, having negative net wealth and paying more than 30% of income in debt servicing) from 1.1% to 1.9% corresponding to approximately 5,000 families. Note that these estimates do not allow for the possibility that new entrants into the housing market may have higher gearing ratios than we observe in the 2003-04 data, making them potentially more vulnerable to house price falls. As such, a fall in house prices may result in a larger increase in the number of vulnerable families than our results suggest. But it should be emphasised that vulnerability does not automatically mean foreclosure. Typically forced mortgagee sales would represent only fraction of those falling in the vulnerable category.

In summary, the overall position of household balance sheets in New Zealand does not appear to be a cause for concern. A caveat to this is the relatively high proportion of housing in both assets and liabilities, leaving households more exposed to changes in the housing market than they would otherwise be with a more diversified portfolio. The proportion of families who could be considered at risk is low. In the case of non-partnered individuals once the effect of student loans is allowed for, the share drops further. However, at least for couples there appears to have been an increase in vulnerable families between 2003-04 and 2008, although the absolute numbers are still quite small.

SoFIE contains a module for assets and liabilities. This paper has relied on the data from wave 2. The assets and liability module was repeated in wave 4, and that data is now available. Work is currently underway to use the data from wave 4 to assess the changes in the debt position of households between 2003-04 and 2005-06.

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Appendix

Appendix Table A.1 – Debt regression results for non-partnered individuals

Dependent Variable is the logarithm of debt	Regression coefficient	Sample means	Marginal effect on debt
Male	0.135	0.451	1,178
	(0.068)*		
Asset decile 2	0.214	0.093	1,203
	(0.144)		
Asset decile 3	0.255	0.110	1,463
	(0.136)		
Asset decile 4	0.333	0.106	1,986
	(0.147)*		
Asset decile 5	0.303	0.110	1,783
	(0.146)*		
Asset decile 6	0.091	0.099	478
	(0.167)		
Asset decile 7	0.882	0.103	7,117
	(0.196)**		
Asset decile 8	1.056	0.105	9,425
	(0.219)**		
Asset decile 9	1.01	0.101	8,777
	(0.238)**		
Asset decile 10	1.171	0.097	11,196
	(0.268)**		
Income decile 2	-0.181	0.094	-1,697
	(0.167)		
Income decile 3	-0.104	0.077	-1,014
	(0.176)		
Income decile 4	-0.225	0.066	-2,060
	(0.191)		
Income decile 5	-0.377	0.095	-3,219
	(0.174)*		
Income decile 6	-0.408	0.101	-3,428
	(0.172)*		
Income decile 7	-0.266	0.119	-2,394
	(0.171)		
Income decile 8	-0.252	0.124	-2,279
	(0.177)		
Income decile 9	-0.101	0.126	-982
	(0.188)		
Income decile 10	0.201	0.123	2,275
	(0.205)		
Age	0.024	37.5	-3,867^
	(0.016)		

Dependent Variable is the logarithm of debt	Regression coefficient	Sample means	Marginal effect on debt
Age squared	-0.001		
	(0.00016)**		
Maori/Pacific	0.027	0.166	232
	(0.084)		
Other ethnicity	0.083	0.060	739
	(0.149)		
1 kid	0.141	0.082	1,303
	(0.103)		
2+ kids	-0.045	0.080	-379
	(0.121)		
Migrant	-0.12	0.160	-999
	(0.107)		
School or vocational quals	0.251	0.541	1,890
	(0.076)**		
Degree	0.781	0.166	7,859
	(0.104)**		
Good health	0.105	0.921	871
	(0.117)		
Waikato	0.157	0.094	1,531
	(0.115)		
Wellington	-0.05	0.131	-434
	(0.104)		
Other North Island	-0.142	0.194	-1,189
	(0.101)		
Canterbury	-0.109	0.149	-925
	(0.102)		
Other South Island	-0.006	0.133	-54
	(0.107)		
Unemployed	-0.494	0.029	-3,676
	(0.182)**		
Not in labour force	-0.274	0.260	-2,261
	(0.107)**		
Maximum income from government	0.167	0.273	1,500
	(0.109)		
Maximum income from other source	0.013	0.127	105
	(0.122)		
Married	-0.155	0.038	-1,113
	(0.228)		
Divorced	0.493	0.143	4,939
	(0.104)**		
Widowed	0.086	0.085	694
	(0.183)		
Separated	0.39	0.101	3,691
	(0.122)**		
Years in employment	0.011	15.4	1,030^
	(0.006)		

Dependent Variable is the logarithm of debt	Regression coefficient	Sample means	Marginal effect on debt
Home owner	1.427	0.336	16,957
	(0.149)**		
Constant	8.063		
	(0.349)**		
Observations	4,460		
R-squared	0.33		

Notes:

Robust standard errors are shown in parentheses below the coefficients

* significant at 5%; ** significant at 1%

^ For age and years in employment, marginal effects are for an additional 10 years relative to the mean

Appendix Table A.2 – Debt regression results for couples

Dependent Variable is the logarithm of debt	Regression coefficient	Sample means	Marginal effect on debt
Asset decile 2	0.373 (0.12)**	0.102	3,847
Asset decile 3	1.034 (0.146)**	0.097	15,411
Asset decile 4	1.426 (0.151)**	0.102	26,868
Asset decile 5	1.445 (0.155)**	0.100	27,539
Asset decile 6	1.429 (0.168)**	0.106	26,985
Asset decile 7	1.452 (0.17)**	0.102	27,806
Asset decile 8	1.426 (0.195)**	0.099	26,875
Asset decile 9	1.791 (0.187)**	0.101	42,433
Asset decile 10	2.019 (0.205)**	0.097	55,480
Income decile 2	0.099 (0.163)	0.081	2,156
Income decile 3	0.188 (0.168)	0.095	4,279
Income decile 4	0.275 (0.168)	0.099	6,537
Income decile 5	0.326 (0.171)	0.107	7,970
Income decile 6	0.171 (0.172)	0.109	3,851
Income decile 7	0.372 (0.174)*	0.111	9,322
Income decile 8	0.57 (0.185)**	0.110	15,876
Income decile 9	0.615 (0.181)**	0.109	17,574
Income decile 10	0.759 (0.193)**	0.102	23,496
Sum of age	0.025 (0.011)*	89.0	-16,866^
Sum-of-age squared	-0.0003 (0.00005)**		
Both Maori/Pacific	0.202 (0.094)*	0.084	6,415
Both Other	-0.335 (0.169)*	0.059	-8,180
Maori-European mix	0.247 (0.102)*	0.091	8,057

Dependent Variable is the logarithm of debt	Regression coefficient	Sample means	Marginal effect on debt
Other ethnicity	0.255 (0.183)	0.028	8,346
1 kid	0.055 (0.084)	0.174	1,630
2+ kids	0.031 (0.074)	0.326	906
Migrants	0.163 (0.112)	0.142	5,235
One migrant	-0.132 (0.087)	0.170	-3,636
Both school or vocational	-0.031 (0.095)	0.281	-844
Both degree	0.121 (0.138)	0.092	3,593
One degree	0.111 (0.11)	0.166	3,299
One unskilled, one school or vocational	0.102 (0.09)	0.290	2,998
Both good health	-0.104 (0.268)	0.894	-3,208
One good health	-0.04 (0.276)	0.094	-1,283
Waikato	0.036 (0.115)	0.103	1,190
Wellington	-0.13 (0.101)	0.117	-4,001
Other North Island	-0.12 (0.088)	0.228	-3,699
Canterbury	-0.175 (0.092)	0.133	-5,265
Other South Island	-0.368 (0.113)**	0.114	-10,071
Both Unemployed	-0.058 (0.511)	0.002	-1,870
Both out of the labour force	-0.693 (0.186)**	0.089	-16,473
One Employed	-0.181 (0.077)*	0.227	-5,456
Unemployed/not-in-labour-force mix	-1.407 (0.477)**	0.006	-24,898
Maximum income from government	0.235 (0.16)	0.094	7,721
Maximum income from other source	-0.049 (0.087)	0.232	-1,388
Neither partner ever married	-0.303 (0.091)**	0.118	-7,807
Other marital status mix	0.333 (0.092)**	0.1	11,774

Dependent Variable is the logarithm of debt	Regression coefficient	Sample means	Marginal effect on debt
Sum of years in employment	0.001 (0.004)	44.609	716^
Home owners	1.06 (0.102)**	0.677	27,170
Constant	8.6 (0.539)**		
Observations	4,755		
R-squared	0.40		

Notes:

Robust standard errors are shown in parentheses below the coefficients

* significant at 5%; ** significant at 1%

^ For age and years in employment, marginal effects are for an additional 20 years relative to the mean

Appendix Table A.3 – Debt servicing ratio summary statistics for non-partnered individuals

		Distribution	Ratio of debt servicing to income		Proportion with debt servicing over 30% of income
			Mean	Median	
Total		582,000	0.158	0.036	6.2
Income quartile	1	16.3	0.539	0.032	15.9
	2	20.2	0.070	0.021	4.2
	3	29.8	0.076	0.036	4.7
	4	33.7	0.097	0.061	4.1
Equivalised income decile	1	9.9	0.836	0.048	22.2
	2	11.4	0.086	0.023	7.1
	3	9.4	0.063	0.017	4.0
	4	10.3	0.075	0.020	3.1
	5	10.9	0.064	0.035	2.2
	6	11.1	0.083	0.044	5.7
	7	10.5	0.085	0.051	4.1
	8	10.3	0.097	0.063	4.3
	9	9.3	0.103	0.066	4.6
	10	7.0	0.101	0.049	5.2
Asset decile	1	6.9	0.064	0.017	3.7
	2	7.9	0.065	0.018	2.4
	3	9.9	0.046	0.023	1.9
	4	10.4	0.050	0.026	1.7
	5	11.0	0.079	0.035	2.8
	6	10.4	0.067	0.029	2.8
	7	11.1	0.165	0.080	7.1
	8	11.2	0.243	0.103	9.7
	9	10.9	0.195	0.100	11.9
	10	10.5	0.535	0.089	15.8
Age group	18-24	25.3	0.073	0.029	3.8
	25-34	24.1	0.186	0.045	5.6
	35-44	18.7	0.189	0.064	8.2
	45-54	14.1	0.200	0.059	10.0
	55-64	9.1	0.294	0.034	8.5
	65+	8.7	0.044	0.006	2.2
Ethnicity	European	78.2	0.176	0.037	6.2
	Maori-Pacific	16.5	0.076	0.033	3.9
	Other	5.3	0.147	0.048	14.3
Dependent kids	No kids	83.2	0.167	0.036	6.0
	1 kid	8.6	0.093	0.040	6.5
	2+ kids	8.2	0.130	0.035	8.0
Migrant	Non-migrant	84.4	0.165	0.037	5.8
	Migrant	15.6	0.116	0.032	8.5

		Distribution	Ratio of debt servicing to income		Proportion with debt servicing over 30% of income
			Mean	Median	
Education	Unskilled	30.6	0.120	0.030	5.4
	Non-degree	52.5	0.186	0.035	6.5
	Degree	16.9	0.136	0.061	7.0
Health	Poor	8.3	0.107	0.027	7.1
	Good	91.7	0.162	0.037	6.1
Region	Auckland	29.4	0.141	0.038	7.9
	Waikato	9.3	0.272	0.038	6.2
	Wellington	13.3	0.103	0.045	5.8
	Other NI	19.9	0.152	0.035	6.0
	Canterbury	14.9	0.096	0.033	5.4
	Other SI	13.2	0.247	0.034	4.3
Tenure	Renters	63.9	0.127	0.025	3.4
	Home owners	36.1	0.212	0.104	11.2
Labour market	Employed	72.9	0.168	0.046	6.4
	Unemployed	2.9	0.296	0.027	9.2
	NILF	24.2	0.111	0.016	5.5
Maximum income	Earnings	61.0	0.091	0.045	4.6
	Government	26.6	0.148	0.021	6.1
	Other	12.4	0.506	0.038	14.4
Marital status	Never married	60.9	0.138	0.035	5.2
	Married	4.0	0.223	0.039	11.9
	Divorced	15.2	0.278	0.062	7.3
	Widowed	9.1	0.081	0.010	4.2
	Separated	10.8	0.138	0.051	10.1

(a) Conditional on having positive debt and positive income

Appendix Table A.4 – Debt servicing ratio summary statistics for couples

		Distribution	Ratio of debt servicing to income		Proportion with debt servicing over 30% of income
			Mean	Median	
Total		709,500	0.143	0.068	8.1
Income quartile	1	20.0	0.226	0.035	12.8
	2	25.6	0.136	0.073	8.5
	3	27.6	0.121	0.077	6.8
	4	26.8	0.110	0.079	5.6
Equivalised income decile	1	2.6	0.900	0.181	34.1
	2	5.1	0.172	0.047	15.0
	3	6.0	0.135	0.028	8.3
	4	8.2	0.137	0.046	7.4
	5	9.6	0.126	0.074	10.9
	6	11.6	0.117	0.084	7.4
	7	12.6	0.138	0.090	8.0
	8	13.9	0.102	0.059	5.8
	9	14.4	0.129	0.086	5.2
	10	16.0	0.097	0.059	5.7
Asset decile	1	9.2	0.038	0.022	0.5
	2	10.1	0.054	0.026	1.9
	3	9.7	0.137	0.067	4.3
	4	10.2	0.139	0.097	6.8
	5	10.0	0.125	0.104	5.6
	6	10.7	0.135	0.104	8.5
	7	10.3	0.153	0.093	5.6
	8	9.9	0.143	0.080	9.9
	9	10.2	0.199	0.098	14.7
	10	9.7	0.298	0.095	23.3
Age group	18-24	3.0	0.142	0.032	4.4
	25-34	17.1	0.122	0.090	6.3
	35-44	27.9	0.176	0.101	10.6
	45-54	25.3	0.172	0.086	9.7
	55-64	16.3	0.125	0.036	7.3
	65+	10.4	0.043	0.006	2.9
Ethnicity	Both European	74.1	0.139	0.069	7.9
	Both Maori/Pacific	8.4	0.116	0.063	7.0
	Both Other	5.8	0.227	0.062	14.7
	Maori-European mix	9.0	0.134	0.073	5.2
	Other mix	2.8	0.180	0.074	14.3
Dependent kids	No kids	50.1	0.130	0.042	7.0
	1 kid	17.3	0.141	0.090	9.3
	2+ kids	32.6	0.162	0.093	9.3

		Distribution	Ratio of debt servicing to income		Proportion with debt servicing over 30% of income
			Mean	Median	
Migrant	New Zealanders	68.9	0.137	0.070	7.1
	Migrants	14.1	0.172	0.054	13.4
	One migrant	17.0	0.143	0.069	8.2
Education	Both unskilled	17.1	0.154	0.050	7.2
	Both non-degree	28.0	0.138	0.080	8.3
	Both degree	9.2	0.125	0.077	8.6
	One degree	16.6	0.156	0.070	8.9
	Unskilled/non-degree mix	29.1	0.139	0.066	8.0
Health	Both poor	1.2	0.082	0.035	5.0
	Both good	89.4	0.147	0.072	8.5
	One poor	9.4	0.107	0.039	5.5
Region	Auckland	30.4	0.134	0.077	10.4
	Waikato	10.3	0.157	0.075	9.6
	Wellington	11.7	0.130	0.074	5.8
	Other NI	22.8	0.139	0.063	6.3
	Canterbury	13.3	0.149	0.065	6.7
	Other SI	11.5	0.165	0.057	8.4
Tenure	Renters	32.0	0.094	0.027	5.8
	Home owners	68.0	0.166	0.100	9.2
Labour market	Both Employed	67.8	0.155	0.083	8.5
	Both Unemployed	0.2	0.378	0.104	23.3
	Both out of LF	8.9	0.066	0.008	3.6
	One Employed	22.5	0.135	0.067	8.6
	Unemployed/NILF mix	0.5	0.071	0.014	8.8
Maximum income	Earnings	67.4	0.125	0.082	6.5
	Government	9.3	0.098	0.014	4.1
	Other	23.2	0.213	0.057	14.5
Marital status	Married	80.9	0.144	0.069	8.5
	Never married	11.7	0.117	0.052	5.2
	Other	7.4	0.164	0.094	9.1

(a) Conditional on having positive debt and positive income

Appendix Table A.5 – Debt servicing ratio regression results for non-partnered individuals

	OLS regression coefficient	Marginal effect on debt serving ratio	Marginal effect on the probability that the debt serving ratio exceeds 0.3	Logistic regression coefficient	Marginal effect on the probability that the debt serving ratio exceeds 0.3	Sample mean
Male	0.111	0.002	0.012	-0.181	-0.007	0.446
	(0.069)			(0.172)		
Asset decile 2	0.255	0.005	0.017	-0.310	-0.006	0.079
	(0.178)			(0.587)		
Asset decile 3	0.326	0.007	0.023	-0.585	-0.010	0.099
	(0.165)*			(0.588)		
Asset decile 4	0.467	0.011	0.035	-0.541	-0.010	0.104
	(0.173)**			(0.555)		
Asset decile 5	0.682	0.017	0.056	0.197	0.005	0.109
	(0.174)**			(0.538)		
Asset decile 6	0.425	0.009	0.031	0.122	0.003	0.104
	(0.182)*			(0.548)		
Asset decile 7	0.945	0.028	0.086	1.134	0.046	0.111
	(0.204)**			(0.502)*		
Asset decile 8	1.064	0.033	0.102	1.539	0.077	0.112
	(0.22)**			(0.517)**		
Asset decile 9	0.980	0.029	0.091	1.844	0.109	0.109
	(0.233)**			(0.545)**		
Asset decile 10	0.964	0.029	0.089	2.218	0.158	0.104
	(0.269)**			(0.577)**		
Age	0.012	-0.012^	-0.040^	0.005	-0.017^	38.5
	(0.015)			(0.043)		
Age squared	-0.001			-0.001		
	(0.00015)**			(0.0004)		
Maori/Pacific	0.091	0.003	0.010	-0.162	-0.006	0.165
	(0.084)			(0.254)		
Other ethnicity	0.301	0.012	0.034	0.995	0.064	0.053
	(0.161)			(0.341)**		
1 kid	0.073	0.003	0.008	-0.245	-0.009	0.086
	(0.1)			(0.359)		
2+ kids	-0.070	-0.002	-0.007	-0.377	-0.014	0.082
	(0.118)			(0.289)		
Migrant	-0.146	-0.005	-0.015	0.002	0.000	0.156
	(0.105)			(0.238)		
School or vocational quals	-0.006	0.000	-0.001	-0.033	-0.001	0.525
	(0.074)			(0.195)		
Degree	0.131	0.005	0.014	-0.290	-0.011	0.169
	(0.104)			(0.322)		
Good health	-0.080	-0.003	-0.009	-0.432	-0.021	0.917
	(0.121)			(0.262)		
Waikato	0.123	0.005	0.014	-0.036	-0.002	0.093
	(0.124)			(0.305)		

	OLS regression coefficient	Marginal effect on debt serving ratio	Marginal effect on the probability that the debt serving ratio exceeds 0.3	Logistic regression coefficient	Marginal effect on the probability that the debt serving ratio exceeds 0.3	Sample mean
Wellington	-0.037	-0.001	-0.004	-0.166	-0.007	0.133
	(0.105)			(0.282)		
Other North Island	-0.083	-0.003	-0.009	-0.098	-0.005	0.199
	(0.1)			(0.246)		
Canterbury	-0.216	-0.007	-0.021	-0.382	-0.016	0.149
	(0.102)*			(0.263)		
Other South Island	-0.058	-0.002	-0.006	-0.579	-0.022	0.132
	(0.108)			(0.299)		
Unemployed	0.106	0.004	0.012	0.895	0.056	0.029
	(0.191)			(0.43)*		
Not in labour force	-0.325	-0.010	-0.032	-0.074	-0.003	0.242
	(0.124)**			(0.278)		
Maximum income from government	0.344	0.013	0.038	1.066	0.051	0.266
	(0.121)**			(0.306)**		
Maximum income from other source	-0.074	-0.002	-0.007	0.995	0.046	0.124
	(0.135)			(0.227)**		
Married	0.035	0.001	0.003	0.716	0.038	0.040
	(0.232)			(0.372)		
Divorced	0.553	0.022	0.064	0.147	0.006	0.152
	(0.099)**			(0.241)		
Widowed	0.091	0.003	0.009	-0.083	-0.003	0.091
	(0.174)			(0.573)		
Separated	0.342	0.012	0.037	0.507	0.024	0.108
	(0.115)**			(0.251)*		
Years in employment	0.011	0.004^	0.011^	0.003	0.001^	16.2
	(0.006)			(0.015)		
Home owner	1.056	0.043	0.122	0.381	0.017	0.361
	(0.142)**			(0.253)		
Constant	-4.162			-2.929		
	(0.359)**			(1.031)**		
Observations	4,135			4,135		
R-squared	0.20			0.15		

Notes:

Robust standard errors in parentheses below the coefficients

* significant at 5%; ** significant at 1%

^ For age and years in employment, marginal effects are for an additional 10 years relative to the mean

Appendix Table A.6 – Debt servicing ratio regression results for couples

	OLS regression coefficient	Marginal effect on debt serving ratio	Marginal effect on the probability that the debt serving ratio exceeds 0.3	Logistic regression coefficient	Marginal effect on the probability that the debt serving ratio exceeds 0.3	Sample mean
Asset decile 2	0.348	0.008	0.025	1.949	0.009	0.101
	(0.121)**			(0.878)*		
Asset decile 3	0.845	0.027	0.078	3.296	0.037	0.097
	(0.139)**			(0.874)**		
Asset decile 4	1.121	0.042	0.117	3.778	0.059	0.102
	(0.141)**			(0.872)**		
Asset decile 5	1.091	0.040	0.112	3.755	0.058	0.100
	(0.142)**			(0.885)**		
Asset decile 6	1.068	0.039	0.109	4.198	0.088	0.107
	(0.151)**			(0.879)**		
Asset decile 7	1.035	0.037	0.104	3.796	0.060	0.103
	(0.153)**			(0.888)**		
Asset decile 8	0.973	0.033	0.095	4.504	0.116	0.099
	(0.172)**			(0.889)**		
Asset decile 9	1.263	0.051	0.140	4.960	0.172	0.101
	(0.167)**			(0.887)**		
Asset decile 10	1.395	0.061	0.162	5.617	0.287	0.097
	(0.184)**			(0.892)**		
Sum of age	0.022	-0.025^	-0.072^	0.010	-0.027^	89.1
	(0.01)*			(0.031)		
Sum-of-age squared	-0.0003			-0.0002		
	(0.00005)**			(0.00015)		
Both Maori/Pacific	0.304	0.017	0.044	0.549	0.033	0.084
	(0.091)**			(0.286)		
Both Other	0.004	0.0002	0.0005	0.347	0.019	0.058
	(0.149)			(0.276)		
Maori-European mix	0.234	0.013	0.033	-0.144	-0.006	0.090
	(0.095)*			(0.286)		
Other ethnicity	0.316	0.018	0.046	0.643	0.040	0.028
	(0.175)			(0.382)		
1 kid	0.069	0.004	0.009	-0.024	-0.001	0.173
	(0.077)			(0.202)		
2+ kids	0.033	0.002	0.004	-0.102	-0.005	0.326
	(0.069)			(0.172)		
Migrants	0.265	0.015	0.038	1.060	0.074	0.141
	(0.1)**			(0.2)**		
One migrant	-0.115	-0.005	-0.015	0.098	0.004	0.170
	(0.081)			(0.202)		
Both school or vocational	-0.095	-0.005	-0.013	-0.145	-0.007	0.280
	(0.089)			(0.236)		
Both degree	-0.308	-0.014	-0.039	-0.539	-0.023	0.092
	(0.124)*			(0.297)		
One degree	-0.109	-0.006	-0.015	-0.240	-0.012	0.166
	(0.1)			(0.253)		

	OLS regression coefficient	Marginal effect on debt serving ratio	Marginal effect on the probability that the debt serving ratio exceeds 0.3	Logistic regression coefficient	Marginal effect on the probability that the debt serving ratio exceeds 0.3	Sample mean
One unskilled, one school or vocational	0.044 (0.083)	0.002	0.006	0.034 (0.231)	0.002	0.291
Both good health	-0.231 (0.243)	-0.013	-0.033	-0.155 (0.696)	-0.008	0.894
One good health	-0.115 (0.249)	-0.007	-0.017	-0.267 (0.696)	-0.014	0.094
Waikato	0.136 (0.106)	0.008	0.019	0.140 (0.24)	0.008	0.103
Wellington	-0.098 (0.093)	-0.005	-0.013	-0.351 (0.224)	-0.016	0.117
Other North Island	0.002 (0.08)	0.000	0.000	-0.136 (0.2)	-0.007	0.228
Canterbury	-0.076 (0.086)	-0.004	-0.010	-0.232 (0.208)	-0.011	0.133
Other South Island	-0.159 (0.105)	-0.008	-0.021	0.027 (0.247)	0.001	0.115
Both Unemployed	0.586 (0.578)	0.043	0.098	1.871 (0.779)*	0.199	0.002
Both out of the labour force	-0.449 (0.18)*	-0.019	-0.054	-0.130 (0.45)	-0.006	0.089
One Employed	-0.030 (0.069)	-0.002	-0.004	0.370 (0.168)*	0.020	0.225
Unemployed/not-in-labour-force mix	-1.192 (0.438)**	-0.037	-0.107	0.920 (0.696)	0.064	0.005
Maximum income from government	0.498 (0.15)**	0.031	0.076	0.994 (0.365)**	0.064	0.093
Maximum income from other source	0.014 (0.08)	0.001	0.002	0.523 (0.16)**	0.027	0.232
Neither partner ever married	-0.281 (0.092)**	-0.013	-0.035	-0.002 (0.303)	-0.0001	0.117
Other marital status mix	0.303 (0.084)**	0.018	0.045	0.301 (0.238)	0.017	0.074
Sum of years in employment	0.001 (0.004)	0.0004^	0.001^	0.010 (0.01)	0.010^	44.7
Home owners	0.772 (0.094)**	0.035	0.095	-0.194 (0.184)	-0.010	0.680
Constant	-3.948 (0.481)**			-5.952 (1.775)**		
Observations	4,725			4,725		
R-squared	0.26			0.16		

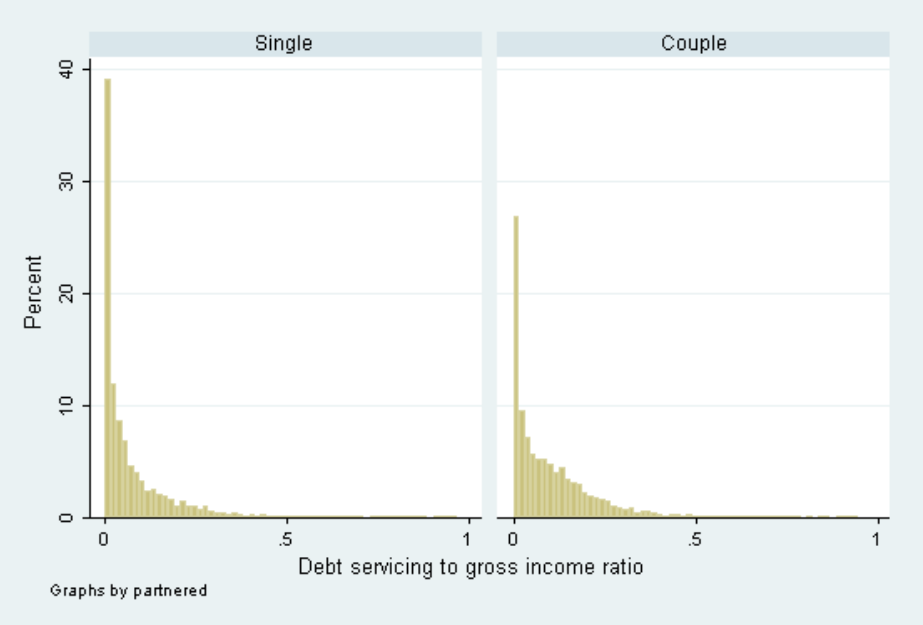
Notes:

Robust standard errors in parentheses below the coefficients

* significant at 5%; ** significant at 1%

^ For age and years in employment, marginal effects are for an additional 20 years relative to the mean

Appendix Figure A.1 – Debt servicing to income ratio



(a) Distributions were cut off at 1

Source: SoFIE wave 2, Statistics NZ; Treasury